ELECTRICAL REVIEW

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ELECTRICAL REVIEW

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THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872

Electricity for Farmers

A POTENT MEANS OF SAVING DOLLARS

ALTHOUGH home food production is now considerably greater than before the war, well over half of all our food comes from overseas and to a large extent has to be paid for in dollars. It follows that every endeavour should be made by the Government to assist farmers to secure a larger output, in particular in the one way which offers the greatest prospect of success, namely, by encouraging them to mechanize their farms. The effect of mechanizing mines is beginning to manifest itself in increased output, and it would seem indisputable that the equally vital farming industry should be similarly helped to modernize its methods.

Mechanization Means Electrification

As in the collieries so in farming; except for the few operations carried out actually in the fields, mechanization means electrification. Considerable progress has been made during the past twenty years in taking electricity to the farmers, and the Electricity Boards all have plans for extending their services to the more remote parts. Following the last financial crisis, however, it was announced in October that £25 million was to be saved on fuel and power investment programmes in 1950, mainly on electrical development. It was later made clear that the savings would have to be made on the distribution side.

Unless the statement in the King's Speech at the opening of Parliament last week that "the Government will continue to take all practical steps to encourage our agricultural population to increase their output by every efficient means" indicates a change of heart, this can only mean the postponement of schemes for bringing electricity to the farming communities. Any steps taken to curtail the utilization of electricity in any industry is to be strongly deplored, and in this case, in particular, so-called "economies" are contrary to the general interests of the country.

If and when farmers do get their electricity, they must, however, play their part. Too often in the past they have been known to clamour for electricity just for lighting and radio. With the growing appreciation of the various ways in which electricity can help on the farm, there has been an improvement, but farmers are still not taking full advantage of the facilities.

Cost Comparisons

A thought about the very much higher wages now paid to the farm worker will put into correct perspective the cost of electrification, and farmers who have adopted the new methods are surprised at their cheapness and convenience. The introduction of electricity does not result in farm workers losing their jobs; moreover, it leads to better living conditions, thus discouraging the drift to the towns.

In planning as well as in the actual provision of their electrical installations it goes without saying that farmers will receive every assistance from the Electricity Boards and from electrical contractors. They realize that it is as much in their interests as those of the farmer and of the country as a whole that the apparatus installed shall function and continue to operate efficiently and economically.

B.S.I. LIBRARY

Inquiries dealt with by our Information Department indicate, from time to time, a lack of appreciation that the British Standards Institution maintains, in London, a library of all the national standards published by some thirty-five countries. These can be freely consulted (at 24, Victoria Street, S.W.1) in addition to the full B.S.I. range. The B.S.I. library handles approximately 10,000 telephone inquiries each year and attends to some 760 persons who visit the library for consultation. Copies of standards may be borrowed for a period of seven days, and loans now total 4,710 annually. Adjoining the library is the Oversea Sales Section, which is now providing nearly 1,000 copies of overseas standards each month. When it is so essential for manufacturers to know the technical requirements of other countries, the library is providing an invaluable service to British industry.

GAS-ELECTRIC COMPETITION

There was a time when the gas companies looked askance at the competitive activities of electricity suppliers and expressed a desire for "co-ordination." This implied forcing upon domestic consumers a particular method of heating, cooking or water heating. It appeared to be the view that electricity was quite suitable for lighting and small power but gas was preferable for other duties. It is pleasing to see that this attitude has not persisted with nationalization. Speaking at a recent meeting Col. Harold Smith, deputy chairman of the Gas Council, said that there was every need of competition. It was of the utmost importance that the public should retain freedom of choice and, moreover, this would keep each industry "on its toes." He pointed to the tremendous scope which still existed for both and said it was the duty of the two industries to keep the public informed of their services.

In last week's leading article we implied that the gas industry had no peak-load troubles. We are assured that in some districts at least there are such troubles, resulting in consumers complaining that the pressure is too low to be of any use. We should have said that gas is *also* embarrassed by peak-load troubles, thus adding to the force of our argument that if gas can go ahead with development propaganda electricity should not fall behind.

GAS-TURBINE FLEXIBILITY

Although not encouraging expectations that gas turbines could be used for base-load generation of electricity in Great Britain in the foreseeable future, Mr. G. L. Duffett in his lecture to the E.P.E.A. (reported on page 521) pointed to some important possibilities. Such possibilities, mainly of export interest, seem enough in themselves to justify the considerable research now being carried out in this country. One is the use of the open-cycle type in relatively small units where waste or natural gas is available or oil distillates are inexpensive or water is scarce. The ability to vary the number and arrangement of components to suit local circumstances, coupled with lower building costs, owing to compactness, should make the gas turbine attractive over a wide field.

ATOMIC ENERGY

A scientist who has devoted his life to the study of nuclear physics and of the monstrous unexpected child to which it gave birth, after fifty years of academic experience, is as much entitled as anyone to guess how it will develop in the years ahead. Nevertheless he is not more likely than the parent of any other problem child to guess correctly. With this preface, the Trueman Wood Lecture at the Royal Society of Arts last week (summarized on another page) developed into an expression of faith in the ultimate employment of atomic energy, a misnomer, for the generation of electric power—but when? Speculation is unprofitable without some surer basis than is available at present.

Rural Electrification

The Farmers' Point of View

By W. A. H. PARKER, M.I.E.E., M.Amer.I.E.E.

TO appreciate the farmers' views on rural electrification it is necessary to examine the course of events since the original Electricity Act of 1882 was passed. At that time nothing else than supplies to cities and towns was visualized, because the whole of the distribution was done by underground cables, and also low-voltage d.c. precluded long-distance transmission. When high-voltage a.c. distribution became an accomplished fact engineers turned to methods of cheapening the costs of transmission and distribution, and overhead lines were found to be the most economical method of doing this.

Mr. W. A. H. Parker is Electrical Consultant to the National Farmers' Union

During the next decade these lines were built across the country to interlink cities and towns, but without providing supplies *en route*, because of the high costs of tapping and the scattered nature of the loads. Again, under the Acts limits were laid down to the areas of the different supply authorities and naturally these were areas where the loads were concentrated, thus leaving undeveloped territory in between. Landowners and farmers were compelled to grant wayleaves across their land without receiving the benefits of supplies of electricity or adequate payments for the disturbance to agriculture caused by the erection and maintenance of the lines.

It was not until after the first world war that attempts were made by some far-sighted authorities to enlarge their areas to cover the surrounding countryside, or to take out Special Orders to include large tracts of the intervening country between the populated centres. Contrary to expectations, they were able to build up substantial business with the rural dwellers and some of them have proved that, with economical and up-to-date methods of distribution and sales policies, they could sell more units per £100 of capital than some authorities in cities and towns, thus proving that rural electrification could be made to pay.

It may be of interest to those engineers who still consider that providing supplies to the countryside does not pay to learn that in 1946-47 one of the largest and most progressive companies sold 6,660 units per £100 of capital expenditure (excluding generation) at an average price of 1.42d per unit, as compared with an adjacent municipal authority which sold just under 6,000 units per £100 at an average price of 1.07d per unit. The recent annual reports of the Area Boards show that the capital expenditure per consumer connected is highest in some areas with cities and large towns and the electricity sold per consumer is not much higher than the quantity in some of the more rural areas.

Short-term planning and the reluctance of the farmer to invest capital in machinery were also responsible for many difficulties which prevented supplies being afforded to farms without capital contributions towards the cost of connection. Many villages and small towns were supplied from a transformer placed in a central position to deal with the domestic and commercial consumers, with long distribution lines running from this position to the outskirts of the village or town. If a farmer living 200 yards away from

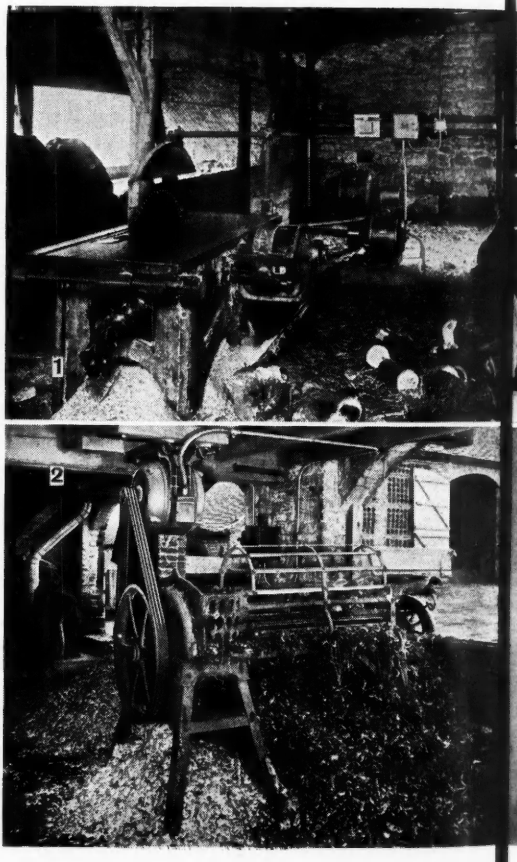
the last house wanted a supply, he was told that he could not be connected to the nearest distributor as it was already loaded to capacity or was insufficient to deal with his load and the only way would be for him to pay the whole cost of running a new distributor from the centre or of a h.v. connection; in other words, the original plan did not take into account the ultimate farming load.

Now let us examine the present position. In 1946 the Government laid a plan before the farmers of this country in which it set a target of an increase of £100 million in food production in order to save dollars and to improve home productivity. The farmers accepted this challenge, on condition that the Government gave them every assistance by providing for the needs of the industry, together with the necessary priorities for labour and materials, and they further urged that schemes for providing electricity and water to all farms should be pushed ahead.

We turn now to the problem of providing supplies on reasonable terms to all the remaining farms throughout England and Wales. There are approximately 150,000 holdings of five acres and above, with a house attached, still without supplies, and in 1946 a Liaison Committee, comprising representatives of the then supply authorities and the National Farmers' Union, examined the whole situation and reported in favour of a five-year plan to cover completely the undeveloped areas, at an estimated cost of £45 million to provide the supplies up to the premises, whilst £27 million would be found by the farmers to cover the costs of wiring and the installation of electrical apparatus. Because of the shortage of materials and the uncertainty caused by the introduction of nationalization these proposals never had a fair chance of showing that they were practicable.

With the advent of the 1947 Act, electricity supply has been placed on a national basis and it is the duty of each Board "to plan and carry out an efficient and economical distribution of those supplies to persons in their area who require them." In view of the vital need of the development of agriculture for food production, etc., extensions of electricity supplies to rural areas should receive the highest priority.

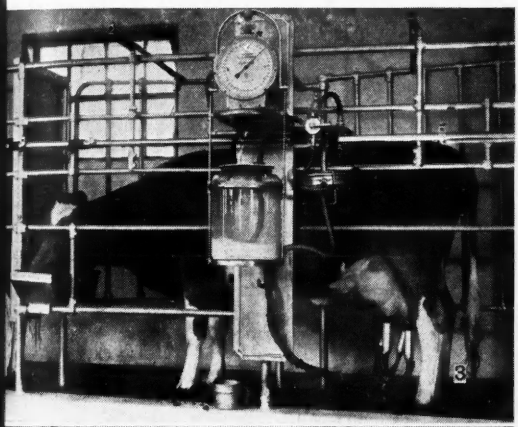
Electricity is required to operate machinery in the barn. (1) An electrically driven circular saw saves a lot of hard work

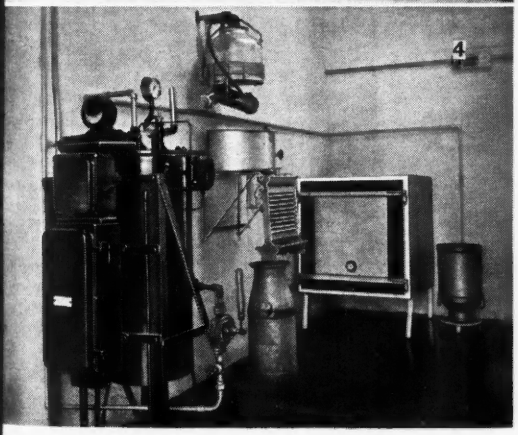


It is interesting to note that during the course of the Bill through all its stages in both Houses every member representing an urban constituency agreed that the cities and towns would have to assist the countryside by financial aid of some kind. Under ordinary conditions supply authorities have been able to reduce their charges to existing consumers from time to time and if present consumers will forgo any reductions which could be made during the next two or three years the financial position of the Boards may be such that they will be able to meet any slight losses in rural development in the initial stages. The Boards should then be able to bear the cost of high-voltage extensions to the farming areas, leaving the farmers and other rural dwellers to cover the remaining costs and charges.

Those unacquainted with rural electrification do not appreciate the changes which have taken place in the farming industry since the beginning of the last war. Practically all the farms throughout England and Wales are mechanized for outside operations, but electricity is required to drive the machinery in the dairy and the barn and to provide the amenities in the farmhouse. It is an accepted fact that the revenue now derived from an average farm has increased by at least 100 per cent since 1939, and with the consumption required for crop drying and other new uses of power, farm revenues of £500-£1,000 per annum are being achieved.

(2) A handy drive for a root cutter and cleaner. (3) and (4) Clean milk depends on electricity for sterilizing, etc.





It is not often realized that most of the milk produced in this country is from approximately 100,000 small farms with herds of up to twenty cows, and if we are to increase the production of clean milk we must see that supplies of electricity on reasonable terms are available to all of them. Apart from the consumption for domestic purposes, the installation of milking machines, sterilizers and water-heating apparatus in the dairy will increase the total consumption to a figure many times that of the small domestic user in the towns, and consequently more capital expenditure per farm connection is justified. Provision of supplies to the farm worker's cottage is also desirable, as he and his wife demand the amenities provided in the towns for their industrial counterparts, and those authorities who have not neglected this aspect are reaping the benefits of increased consumption. Be-

the last house wanted a supply, he was told that he could not be connected to the nearest distributor as it was already loaded to capacity or was insufficient to deal with his load and the only way would be for him to pay the whole cost of running a new distributor from the centre or of a h.v. connection; in other words, the original plan did not take into account the ultimate farming load.

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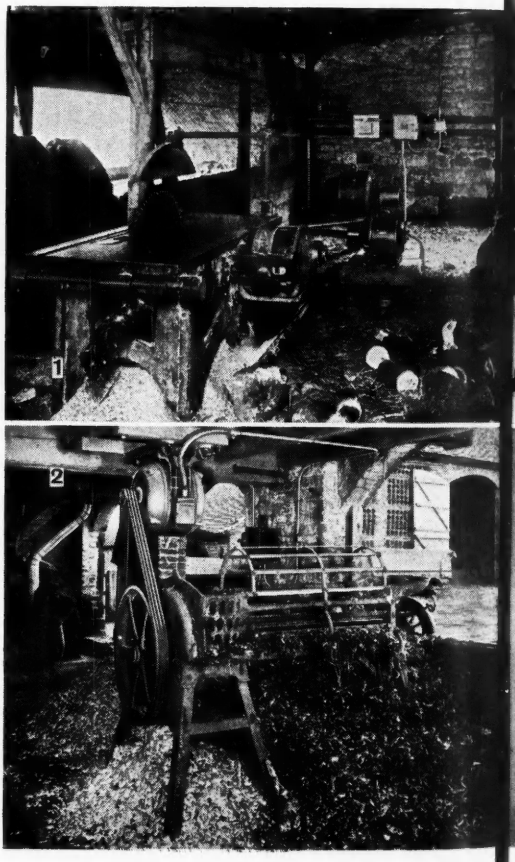

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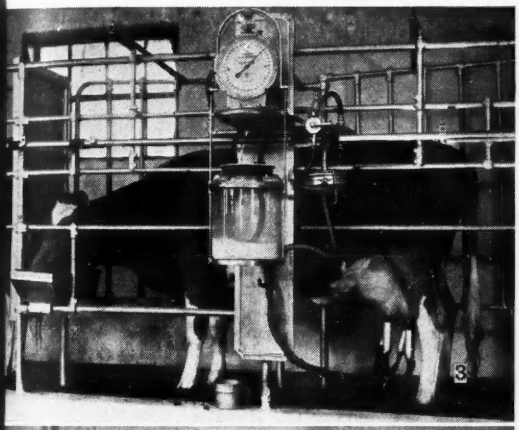
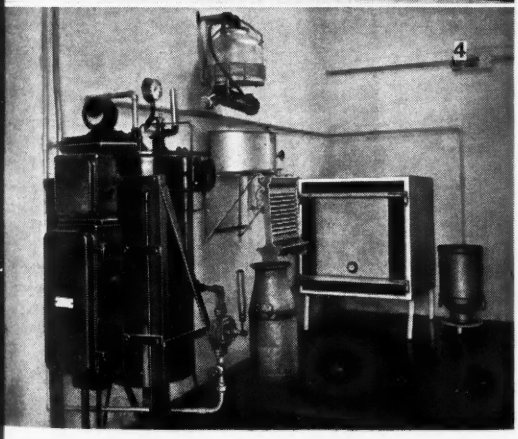




It is not often realized that most of the milk produced in this country is from approximately 100,000 small farms with herds of up to twenty cows, and if we are to increase the production of clean milk we must see that supplies of electricity on reasonable terms are available to all of them. Apart from the consumption for domestic purposes, the installation of milking machines, sterilizers and water-heating apparatus in the dairy will increase the total consumption to a figure many times that of the small domestic user in the towns, and consequently more capital expenditure per farm connection is justified. Provision of supplies to the farm worker's cottage is also desirable, as he and his wife demand the amenities provided in the towns for their industrial counterparts, and those authorities who have not neglected this aspect are reaping the benefits of increased consumption. Be-

fore the last war it was usual to obtain a yearly revenue of £2 to £3 per cottage, but £6 to £8 is now quite usual, and is increasing.

All this goes to show that if every effort is made to lower the costs of distribution and increase the use of electricity for all purposes, the financial results, in the initial stages, may show slight losses, but as revenue increases they will be wiped out. A policy of promotional tariffs, with lower unit charges directly all the costs and charges applicable to the connection are met, will provide the incentive to the farmer to increase his use of electricity in every direction. Both the landowners and farmers are determined that capital contributions and line rentals must cease as they are based on the costs of connection. The position of the distribution lines relative to the farms to be connected is determined by the Board's officials, with the result that one farmer may be asked to pay £500, whilst his neighbour obtains a free connection.

What is wanted is an effort by all the Boards to reduce the cost of overhead distribution by standardizing the types and sizes of lines and transformers. In spite of all the efforts made by the E.R.A. and other bodies, authorities are still erecting lines costing two or even three times as much as those erected in accordance with B.S.1320 and the farmer or landowner is called upon to pay increased capital contributions, rentals, or minimum guarantees to meet these extra costs. Then some measure of standardization of systems of rural development may be necessary to lower costs, and farmers are prepared to accept single-phase supplies where it can be shown that three-phase supplies are uneconomic.

Basis of Tariffs

Farm tariffs should be based on the lowest of the costs and charges as ascertained at definite intervals from the annual returns of the Boards, excluding London. For instance, taking the costs as the sum of the costs of electricity delivered, plus distribution and management, and the charges to include all financial charges, these could be related to each £100 of actual capital expenditure required to connect the farm to the nearest high-voltage mains.

These mains should be planned to provide the backbone of a system for supplying all the remaining villages and hamlets in the area. The tariff could then be made up of a fixed charge plus a block of units, or alternatively the first block of units of a stepped rate to cover the costs and charges per £100 of new capital for the connection, with one or more cheaper blocks of units for the energy consumed in excess. The first part of the tariff would provide a guaranteed minimum revenue, whilst the remaining lower charges would be an incentive to increased use; the basis of such a tariff should be standardized throughout the country.

Gaining Farmers' Confidence

The farmer is by nature a cautious individual, because all the planning in the world will not save his crops from disaster if nature is unkind, and he likes to proceed slowly when embarking on any new project. Those authorities with knowledge of farm connections know, however, that once his confidence is obtained, the annual revenue increases year by year, and since 1940 he has been willing to launch out on new projects because of his confidence in the stability of his industry. His interest in electrical matters can be quickened by demonstration of machinery in action and by facts and figures of operating costs, and above all, by representatives from the Boards who can put these before him in language which he understands.

Finally, if the Boards will take a broad view of rural development they can be assured of the support of all concerned in improving agriculture and its related industries, and the well-being of our rural population.

Institute of Fuel

THE annual general meeting of the Institute of Fuel will be held on 27th April, at the Connaught Rooms, Great Queen Street, London, and will be followed by a general meeting of members at which Dr. D. T. A. Townend will deliver his second presidential address. The annual luncheon of the Institute will be held at the Connaught Rooms. The principal guest and speaker will be Eng. Vice-Admiral Sir Harold Brown, who has been chairman of the Fuel Research Board since 1947.

Mr. Martin Harvey describes modern soil warming methods to the Mayor and Mayoress of Hereford (Ald. and Mrs. W. Pigott) at an agricultural show

Methods of Approaching Farmers

Securing Farming Business

By **MARTIN M. HARVEY***, Associate I.E.E., M.I.B.A.E.

SELLING to farmers is essentially the same as selling to other classes of the community—namely, giving a "straight deal" and good service in the broadest sense. One then obtains a satisfied customer, which is the best advertisement, as the farmer does not forget to tell his neighbours. The results of sales approaches may not be so rapid in achievement as when handling urban prospects, as by nature and environment the farmer and his family are more cautious and take longer to come to a decision than a townsman. This is only natural, as rural life and farming are in themselves long-term processes.

Above everything, therefore, the rural salesman must have patience. A farmer will often come to buy something electrical up to a period of two or three years after hearing about it or seeing it at an agricultural show. This may be due to the fact that, however much he desired to buy it, he did not have a supply of electricity at the time of seeing the article displayed.

Now what has electricity to offer the farmer? First, he requires a reliable supply of electricity and apparatus to give good service, thereby saving labour and cutting down production costs in the fullest sense, the same as a factory owner. Secondly, electricity will help his hard-working wife and family in their domestic problems and thirdly, it will give him, through radio and television, some of the amenities and entertainment from which distance has previously cut him off.

When dealing with the uses of electricity in farming we must remember to fit it into the method of farming prevailing in the area and not try to fit the farming to electricity. In other words, we must not expect to sell large milking parlours to Welsh hill sheep farmers.

As in any business of obtaining sales, there are two methods of approach—the indirect method and the direct or personal contact method. The former covers many phases and is essentially a long-term policy. It starts with advertisements in the local press, the N.F.U. and farming periodicals and also in farm

* Agricultural Engineer, Midlands Electricity Board.

institute and agricultural college magazines. In addition, agricultural shows should be attended and good working displays staged at them.

The one-day shows, ploughing matches and flower shows should not be neglected. More business is often done at these intimate shows than at the larger ones. Staffs on these show stands should be well "briefed" before the opening and should have full information of all the equipment shown. They should not be "stand-offish" but should try to be as helpful as possible. Short working shifts help to keep the staff "on its toes."

Contacts with Officials

Another long-term method of obtaining business is by contact with Ministry of Agriculture officials and technical officers at the provincial headquarters and also the N.A.A.S. officers on the staffs of County Agricultural Executive Committees. This contact is made by the chief agricultural and rural officer of the Area Board and also by the Sub-Area agricultural assistants and District office assistants who deal with farming inquiries. These N.A.A.S. officials often have electrical questions asked by farmers and I have found that they welcome the help of electro-farming specialists. They appreciate assistance in drawing up schemes for farmers and the name and address of the inquirer can generally be obtained in a diplomatic way. This can be a valuable "lead." We can also help these agricultural officials by lending them equipment for their own stands at shows. All this means that we have a large number of unofficial salesmen pushing our business. The local agricultural colleges should not be forgotten, nor the farm institutes. Contact should be made with their principals and offers of help made in the form of loans of equipment and lectures to the students on electro-farming subjects. Most of them welcome these lectures. It is possible to obtain the help of manufacturers in the loan or sale at a discount of electrical apparatus to these farm colleges. The experience obtained by the students in handling this equipment will reap for us a future harvest of sales.

Another method of indirect approach is the personal contact of Sub-Area agricultural engineers with all secretaries and officials of local branches of the N.F.U. and Young Farmers' Clubs and making arrangements to attend their meetings to give talks, illustrated by E.D.A. farming films and slides. In each town one rural assistant or the District manager should be a member of the local N.F.U. branch. I happen to be president of a local Farmers' Discussion Club, which is mutually helpful in many ways.

Regarding local displays, attractive showroom window exhibits can be staged of electro-farming apparatus, and invitations can be sent out to prominent local farmers and their wives to visit you on market days. The housecraft adviser can also arrange a cooking demonstration for the ladies during the same afternoon.

Small inquiry bureaux or stands can be permanently placed in the cattle markets of the larger towns, generally for a small weekly rental, and opened up on market

An agricultural engineer advises on the site for a new grass-drying plant

days. The display of a few appliances will also attract farmers. In one town where I lived we had our stores adjoining the cattle market and we did a large trade every week in spare rubber parts for milking machines, for which we were agents. We also sold many lamps and other appliances. In any case, even if no inquiry bureau is contemplated it is not a waste of time to walk round the cattle market on market days to greet consumers. It is surprising how much business can be picked up in this way. All these indirect methods will greatly assist the representative when he actually calls at farms to obtain business.

When new villages are being connected and the houses wired, a travelling caravan, large enough to stage a small demonstration and carrying apparatus, both domestic and farming, can be placed on the village green for a couple of days and active door-to-door work undertaken.

Regarding the direct approach, a few "dos and don'ts" will be helpful. Treat every farm as if you were electrifying your own place, bearing in mind its size and the capital available. Learn the types of farming carried on in your district, and if you mention names of farm machines see that you call them by their correct names. The same applies to the various types of cows, pigs, poultry, etc. It is better not to say anything than to call a Friesian cow an Ayrshire. While it is helpful to be able to discuss agriculture with a consumer, do so only if you are sure of your ground—if not, stick to your electrical knowledge and the apparatus you wish to sell.

Do not call on farmers on market days or in the middle of a "catchy" hay harvest; they will not have time to talk to you. If you have to call at that time, however, you should concentrate on the domestic side. You will find that you can pull off more deals by the farm fireside in the evening than at any other time of the day. This may be a nuisance, but if your heart is in your job you will not mind. Do not forget to cultivate a knowledge of domestic apparatus, as the electricity consumption in the house is very often larger than that on the farm itself.

Keeping Track of New Schemes

To return to the organization of your visits, keep in touch with the Planning Department for information regarding new schemes and developments. You should also make friends with the wayleave officers; they are generally the first people to see the farmers and they can furnish you with useful "leads" to business. It pays to teach the wayleave officers the basic facts and prices of the more common types of appliances, as farmers ask them many questions during their visits.

Rural salesmen and assistants should have as general and broad a knowledge as possible. They should deal with as many questions as they can on the spot and call in the experts only in cases of necessity. The farmer, as a one-man business, has to deal with all angles of his profession and he expects us to be able to do the same. You will doubtless have to call in the housecraft adviser to see the farmer's wife, but she will not mind this as they can get together over recipes, etc.

When farms are running smoothly you can take your new prospect to talk to the satisfied user

Some people never get out of the wood
others finish the job in one stroke with electricity
MEB
MIDLANDS ELECTRICITY
Midlands Electricity Board, The Square, Shrewsbury. Telephone: 3816

The indirect method of approach to the farmer by means of local press advertising

I am often asked if I favour special "all-electric" farms run by Electricity Boards. My answer is "No" as farmers do not take any notice of them; they know that they are only exhibition farms, often equipped with too much apparatus for their size and type of farming, and that profit earning is not a necessity. It is much better practice to persuade a few farmers in each new district to equip their farms fully, purchasing the equipment for preference, or the appliances can be loaned to them on trial with a view to their purchase, if satisfactory, at a later date. When these farms are running smoothly, you can then take your new prospect to talk to the satisfied user. This is worth all the sales talk you can bring to bear, for if the farmer's pal says it is O.K., well, it is O.K.! Incidentally, you will never have any loaned material returned; it is always kept and paid for!

Low-loaded Equipment

With the need to study peak loads, you should always try to install low-loaded night-operated dairy equipment for steam raising and water heating. This will benefit the farmer as well as our power stations. The same applies to grain grinding; the small, low-powered automatic hammer mills keep down the motor sizes and help to solve the farmer's labour problems.

From what types of farms may we expect the greatest returns of sales and electricity consumption? I would say in the following order: Dairy farms, large mixed farms with crop drying, specialized poultry farms and hatcheries, horticultural and nursery holdings if soil warming or irrigation is used, hop farms, large cereal farms with grain dryers, small general farms, and small holdings. Never forget, however, that on the domestic side electricity will be used every day of the year on any type of farm.

The Electrical Research Association and E.D.A. publications on electro-farming will keep you up to date and should be included in every rural assistant's library. Finally, it is the personal contact with farmers which brings in the business: you cannot get business sitting in an office. To conclude with an old country saying, "The more hares you start, the more you will catch," and if, farmer-like, your consumer wants a discount off "for luck," remind him that "Service is remembered after price is forgotten."

Batti-Wallahs' Dinner

LAST Monday evening was the Ladies' Night of the Batti-Wallahs' Society at the Café Royal, Regent Street, London, W.1. The large company included many well-known electrical people some of whom appear in the photographs which we took at the dinner-dance and reproduce on the opposite page.

At the dinner Mr. H. Nimmo (chairman, Southern Electricity Board) proposed the health of "The President and his Lady" in felicitous terms and Mr. Forbes Jackson (L.C.C.) replied. The only other toast was "The Ladies," proposed by Col. H. J. Wellingham, M.C., the response being made by Dame Caroline Haslett, D.B.E.

Dance music was provided by the Leon Wayne Orchestra and the guests were entertained by Henderson and Henshall, who gave an exhibition of dancing, and by Mr. Frank Raymond, comedian.

AT THE BATTI-WALLAHS LADIES' NIGHT

1.—The President and Mrs. Forbes Jackson greet Mr. H. Nimmo and Miss Nimmo. 2.—Sir Montague Hughman with Mr. and Mrs. Forbes Jackson. 3.—Mr. and Mrs. W. N. C. Clinch being received. 4.—Mrs. P. V. Hunter, Lord and Lady Citrine and Col. H. J. Wellingham. 5.—The President replies to a toast. 6.—Dame Caroline Haslett responds for the ladies

VIEWS on the NEWS

By REFLECTOR

MR HERBERT MORRISON at a dinner of the Master Signmakers' Association, bemoaned the disappearance of the old trade signs which were a characteristic feature of towns 200 years ago. He said that there was still room for originality and craftsmanship. New materials, electricity and new shades of neon lighting widened the sign makers' opportunities. His warning against standardization and "careless vulgarity" was timely and one which will be backed by all who care for the appearance of our towns. But of course it is not always the signmakers who are to blame for sins of this sort; more often than not they are merely carrying out the orders of their customers. They must do their best to inculcate in those customers a sense of propriety.

★ ★ ★

The *Daily Telegraph* reports that 81 of the 94 buildings in the village of Blaxton, near Doncaster, have now received electricity after some of the houses had been wired for 16 years. I can imagine the delight of a tenant rewarded at last after trying the switches daily for so long a period. Not so fortunate are the people of Windsor, whose Council has been told (says the *Windsor Express*) that "the Minister of Health does not consider the present a favourable time to install electricity in pre-war houses but is willing to consider small-scale proposals."

★ ★ ★

Advertisements by whole industries or large groups are a commonplace to-day. The motives are varied. Some offer a public service and are actually "selling" advertisements. Others, because of the current trend, are designed to tell the public, openly or by implication, that industries are better run now than they would be by national boards. A third class is preponderantly "prestige" advertising: that is the products of the group concerned are not generally sold to the public nor are the industries which they represent immediately threatened with nationalization. An example which probably falls into this class is the current Press advertising of Associated Electrical Industries. These announcements stress the "family" nature of the group and its importance in the national economy. Its apprenticeship schemes and research expenditure are mentioned. Emphasis is laid on the widespread employment given by its members and its contribution to our export trade.

★ ★ ★

In the March "Journal of the Brush Group" reference is made to an earlier magazine, the "Brush Budget," which was started as long ago as 1898 and ran until 1915 with a brief reappearance just before the last war. The article is illustrated by reproductions of some of the covers of this early "house" magazine dated 1907 and 1909. They are typical of those more leisurely Edwardian days as are the references in the text to the contents of past "Budgets." There was, for instance, "a wonderful tramway system on a single overhead wire, whereby drivers moving in opposite directions would politely halt and after the usual pleasantries and inquiries as to health would exchange their trolley arms and go their separate ways."

★ ★ ★

Touchiness in industry seems to be increasing. Men "down tools" for very trivial reasons and managements are not always free from pique. A recent case is reported in which a man at an electrical works drew a caricature of a member of the management on a canteen dartboard. He was discharged and his fellow workers who stopped work to hold a meeting to discuss the affair were also dismissed. A schoolmaster finding an uncomplimentary portrait on a blackboard would be able to handle the culprit in the traditional manner but this method is not open to works managements in dealing with such juvenilities of course.

Dairy Farming Simplified

Lower Costs and Increased Leisure

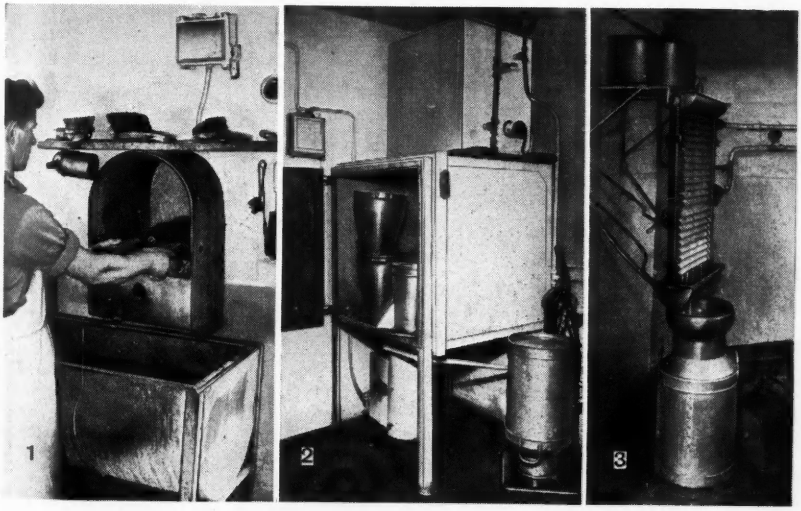
By WILFRED H. SAVAGE

MY object in writing this article is to show my dairy-farming colleagues how, with the use of electricity, not only will their production costs be reduced but their work need not be such a tie as it has been in the past. Hall Farm, Weatheroak, eight miles south of the centre of Birmingham, has been rented by my family for the past hundred years and I myself was born there. It extends over 40 acres, half arable and half grass.

I took over complete control on my own account in 1930 and succeeded in establishing a useful retail dairy business a few miles away where I was able to dispose of my milk, eggs and poultry at good prices. Foreseeing that the future lay in T.T. milk production I had my cows tested, the 20 per cent which reacted being disposed of at market price without much loss.

When the war came my wife and I alone carried on the work, running both our farm and the retail milk business, as well as undertaking ploughing and planting orders. This was a very bad time indeed. Hours were long and exhausting, all work being done by hand—milking, bottle washing, bottle filling and pumping water. Then with faint hope I approached the Shropshire, Worcestershire and Staffordshire Electric Power Company for a supply of electricity and with the support of the County War Agricultural Executive Committee I at last succeeded in obtaining a supply in 1944. In the meantime our premises were brought up to T.T. standard and a suitable dairy was provided. All my original

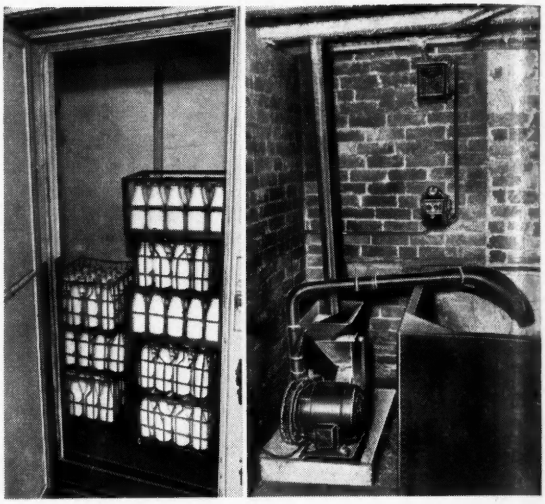
(1) Milk bottles can be washed two at a time on this machine. (2) A 2 kW immersion heater in a 30 gal tank provides adequate hot water. The sterilizer provides steam for the chest, churn table and milking teats and rubbers. (3) Milk can be kept longer if a refrigerated cooler is used



electrical equipment was purchased new and included a milking machine, sterilizer, water heater, pump, bottle washer and cattle clipper.

The Perkins sterilizer, which cost me £54, comprises a 27 cu ft chest with a 6 kW steam generator mounted underneath. Sterilizing takes one hour, steam being provided not only for the chest but also for the steaming stool and for the nozzles of the milking machine. The water heater (£16) is the best investment I have made. It is of the S.W. & S. Company's own construction and consists of a 30 gal rectangular tank fitted with a thermostatically controlled 2 kW Hotpoint immersion heater and lagged with sawdust. It has not been switched off since it was installed.

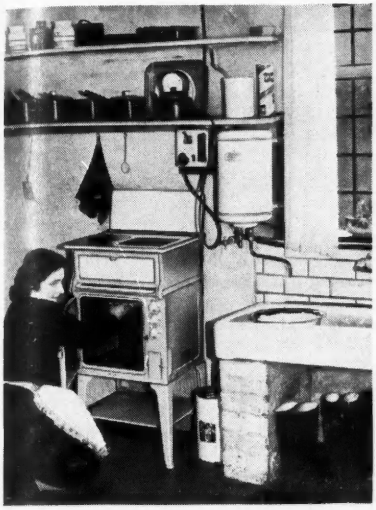
Approximately 250 gallons of water is provided every day for the dairy and house by the Beresford pump (£20) which has given no trouble since it was installed. The Model 4 Aveling Barford bottle washer (£34) powered by a ½ h.p. motor washes two bottles inside and outside at once. It does not require any floor space since it is fitted through the wall to overhang the washing trough by 4 in. Two thousand bottles can be washed for one unit of electricity.



(Left) After bottling the milk is kept in this cold room until it is delivered to customers. (Right) An "Essex" mill grinds up automatically all the cattle food required and switches itself off when the job is done. The food thus prepared has a greater nutritive value than that milled in bulk and stored (Below) Mr. and Mrs. Savage loading the delivery van ready for the daily milk round

My 3 h.p. "Essex" mill (£56) has no "frills" such as sealed bins. The meal is blown into an old water tank covered by a sack. The mill shuts itself off automatically when the supply of corn from the hopper in the loft ceases. We prefer to do a little daily in preference to grinding in bulk, since the meal is then always fresh, runs no risk of heating and moreover is better for the stock.

The cows quickly took to the milking machine (£100)



Mrs. Savage finds electricity a boon in the kitchen too. (Below) Cows are milked entirely electrically. Mr. Savage does not believe in finishing off by hand. In the foreground besides the milking machine is an electric clipping machine

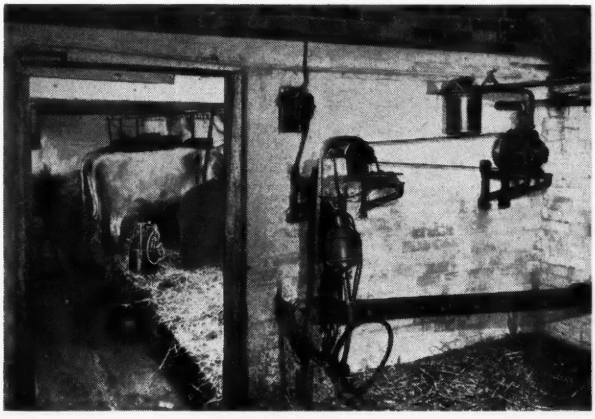
which is a two-unit Alfa-Laval set powered by a 2 h.p. motor. No stripping is done by hand and no reduction in milk yield has resulted. The Wolseley clipping machine, used for clipping the cows' udders, flanks and tails, has proved well worth the £18 I paid for it. Later I bought second-hand for £150 a refrigerator and 150 cu ft cold store. The refrigerator unit driven by a 3 h.p. motor serves a milk cooler as well as the cold store. Immediately the milk leaves the cow it is put over the cooler which brings its temperature down to below 40 deg F. It is then bottled, capped and sealed by a 3-valve hand-bottling machine, the quantity of milk handled not justifying the use of an electrically operated machine. To await retail deliveries the bottles are placed in the cold store, which is ideal for the producer-retailer as it gives the milk long-keeping qualities. Returns are not wasted and surplus milk can be carried over. We make no Sunday deliveries thus having more leisure.

Another piece of apparatus I have installed is a battery charger (£8) which is useful for charging the batteries for our car, tractor and electric fencer, not to mention the neighbours' wireless batteries.

Lighting has been provided in all the buildings and also the yard. In the cow houses the fittings have been set at an angle on the rear wall (high enough to avoid being splashed with dung) to light up the "working end" of the cow. Power points have been provided for the clippers, electric drills, etc. Excluding the domestic appliances, but including £80 for the wiring, the whole plant as installed to-day costs £536.

In the farmhouse Mrs. Savage has not been forgotten. In the kitchen she has her cooker, thermostatically controlled water heater, kettle, iron and a 2 kW fire. The farmhouse has good lighting and plugs in all rooms for portable fires, vacuum cleaner, etc. A radio set, clock and blanket are other electrical amenities she can now enjoy and I would not be without my electric shaver.

Electricity has completely changed our life. The work is done better and



DETAILS OF SAVING OBTAINED BY USE OF ELECTRICAL EQUIPMENT BASED ON ELECTRICITY AT 1½d PER UNIT, LABOUR AT 1s 6d AN HOUR, COAL AT 3s 8d PER CWT

Apparatus	Initial capital cost	Interest, depreciation and R. & M. at 10%	Cost of electricity consumed	Total present cost	Value of labour saved	Value of mater.al saved	Total saving	Net annual gain or expense
Water heater ...	£16	32/-	329/-	361/-	273/-	190/-	463/-	102/-
Sterilizer	£54	108/-	73/-	181/-	150/-	190/-	340/-	159/-
Bottle washer ...	£34	68/-	2/-	70/-	546/-	—	546/-	476/-
Pump	£20	40/-	12/-	52/-	273/-	—	273/-	221/-
Essex mill	£56	112/-	12/-	124/-	730/-	—	730/-	606/-
Milking machine ...	£100	200/-	30/-	230/-	820/-	—	820/-	590/-
Wiring	£80	160/-	—	160/-	—	—	—	—160/-
Proportion of assessment	—	—	60/-	60/-	—	—	—	—60/-
Totals	£360	£36	£25 18s	£61 18s	£139 12s	£19	£158 12s	£96 14s

quicker and we have leisure, a thing we never knew before. Nevertheless, we were tied to the farm seven days a week and as I developed rheumatism very badly we now employ one capable man, making it possible to take a holiday when we feel like it. No other labour whatever is employed and the three of us can run the whole farm and milk round with ease. If circumstances necessitate it, one person can milk the twenty cows, bottle and deliver the milk all on his own.

To obtain an idea of the actual running costs, separate meters were installed for each appliance for a twelve-month period in 1945-46 (before the refrigerator and cold store were provided) and the results are given in the accompanying tables. It should be noted that at that time labour was 1s 6d an hour and coal 3s 8d a cwt. We then had thirteen cows, usually ten in milk. It will be seen that it cost us 10s a week for the farm at 1½d a unit and 5s 10d a week for the house at 2d a unit. Per gallon of milk the cost was ¾d.

To-day we have twenty cows, normally sixteen in milk, and the cold room and milk cooler have been installed. With the charges for electricity now reduced to 1d a unit for both farm and domestic use our account is about £1 a week. When it is taken into consideration that a farm worker's wages now amount to £4 10s a week, plus another £1 for overtime, it will be appreciated how low the cost of electricity is in doing conveniently a very substantial amount of work as well as providing added comforts and amenities.

ANALYSIS OF OPERATION OF ELECTRICAL APPARATUS DURING THE YEAR ENDED 14th AUGUST, 1946

Apparatus	Total No. of Units	Cost per Day	Former Time and Expenses	Remarks
Water heating	6,324	11½d	3½ hours and 1 cwt coal	Electricity ¾d per unit.
Sterilizer	870	3.6d	No previous method.	All tests of milk in highest grade.
Bottle washer	24.5	0.1d	7 hours.	Approx. 192 bottles per day.
Pump	137.75	0.5d	3½ hours.	Approx. 210 gals per day.
Essex mill	145.5	0.6d	1 hour 12s 6d cost of contract grinding.	Approx. 1½ cwt per day.
Milking machine	355.5	1½d	10½ hours.	Approx. 10 cows milked twice per day.
Cooker	1,220	6.7d	—	Cooking for 3
Fires	640	3½d	—	—

Average price per unit for farm excluding water heating consumption 1½d. Average price per unit for house 2d. Cost per gallon of milk 0.73d.

Welding Slide Rule

THE spot welding of mild steel is simplified to a considerable extent by the use of a slide rule arrangement which has just been issued by the British Welding Research Association. It covers a wide range of working conditions and on setting the rule to the thickness of the material to be welded the minimum electrode pressure, tip diameter, minimum edge distance, welding time and welding current are directly read off.

The range of material thicknesses (in inches or s.w.g.) for which the calculator can be used is from 0.01in to 0.25in. The rule is constructed of ivorine-faced cardboard and measures about 9in by 4in; on the back is set out a selection of useful data relating to the spot welding of mild steel. Copies of the rule are available from the Association at 29, Park Crescent, London, W.1, price 1s 6d.

Farm Wiring

Special Features to be Considered

By J. P. INGLIS, A.M.I.B.A.E.

Mr. Inglis is area manager, Hereford, for Drake & Gorham, Ltd.

THERE is an impression not infrequently voiced that there is something quite new and perhaps a little mysterious in the wiring of farm premises. To a large extent this is quite wrong. It was quite common practice forty or fifty years ago for a contractor to install wiring for lighting in stables, barns, dairies and other farm premises attached to the large country house of those days, especially where such premises were within convenient reach of the low-voltage service from private plants, then the most common form of supply. Fairly often, however, such work was carried out with materials now known to be not the most suitable, and at times there was some speculation as to why the stables, for example, seemed to require re-wiring more frequently than other parts of the premises.

The wiring of farm buildings and the problems connected with this operation have increased in importance since the war owing to the demand for greater home-produced food supplies with limited labour resources. This rural development has given impetus to research, not only into the most suitable materials for farm wiring installations, but also the best practice to be followed in their installation and use. Thus the contractor now has an extensive and increasing range of specially designed equipment with which to work, and also considerable data in the form of a "Code of

Special attention should be paid to the lighting of the yards and roadways in and about the farm

Practice" as well as informative publications issued by various sections of the industry.

It is uncommon for the contractor to be furnished with a complete specification for a farm wiring installation, drawn up by a consulting engineer, as is frequently the case with other types of installation. Rather does the farmer announce his intention of having the work carried out and the design and even the extent of the installation is left largely to the contractor. It may, therefore, be well to examine some of the considerations to bear in mind in connection with the design, layout and execution of the wiring installation.

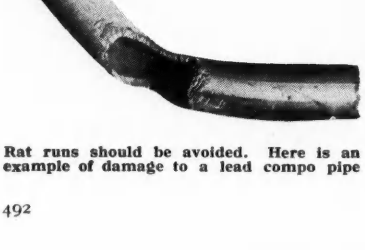
Necessary Precautions

Safety is of first importance. Farm animals are particularly susceptible to electric shocks and a very small current at a few volts can cause the loss of a valuable beast. If the wiring and fittings cannot be made all-insulated, the earthing arrangements should receive most careful study, particularly when it is proposed to utilize the water supply. Satisfactory earthing in rural areas is frequently a difficult and costly business. It is generally dangerous to accept the water supply as adequate without careful preliminary tests. The pipework may go no farther than a well or, where underground, it may be made of non-conducting materials or it may be fed from a tank in the roof with no electrical connection with the general mass of earth.

The farmer will find the lighting section of his installation one of the greatest benefits. During a large part of the year his work starts some hours before daylight and finishes after dark ; in addition, stock frequently have to be visited during the night for one purpose or another.

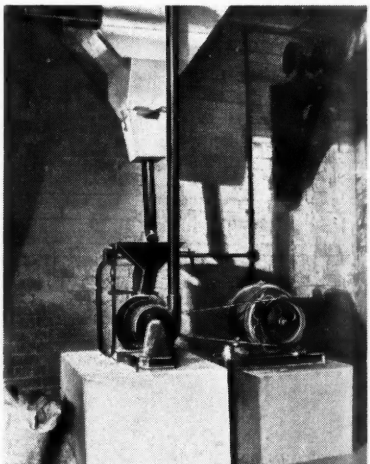
No very high level of illumination is required over most of the area and generally a comparatively few well-placed lights are adequate. It is as well to remember that the stock require no lighting; it is the farmer and his assistants who want to see. A study of the way the farm is worked will indicate the most suitable positions for the switches. A point where the farmer habitually has his hands full is not the best place for a switch probably controlling a light which can very well be group-controlled with others to greater advantage and often with some economy.

Special attention should be paid to the yards and roadways about the farm. Good general lighting here can be a great convenience and can make the whole appearance more attractive on a dark winter night. Switching should be arranged progressively round the buildings, commencing at the farm house, so that some lighting is available immediately on leaving it. Good, and so far as possible shadowless, lighting is a great advantage in such places as calving pens, dairies, etc., where an increased intensity is required, and these are positions where



Rat runs should be avoided. Here is an example of damage to a lead compo pipe

A modern small mill superseding heavier grinding equipment reduces the load



This inefficient line shaft in a farmyard has now been replaced by modern electrical equipment

fluorescent fittings can be used to advantage.

All cables and fittings should be out of the reach of the animals, and should be protected against accidental damage. Overhead cables should be well clear of loaded farm traffic and bulky or high machines; a load with a hay fork in the top can cause considerable trouble. Equipment in barns should be sited bearing in mind that at certain seasons the barn is filled and thus the fittings and cables come within the reach of workers using tools.

Most farmers are at some pains to keep their buildings free from pests, particularly rats, but there can be no guarantee that they are completely successful. If cables are installed in rat runs it is likely that there will be interference and damage to the installation. Electricians should be able to recognize a rat run and if possible avoid it, for if trapped or impeded in their normal route it is astonishing what rats will do.

Siting of Machines

When considering services to machinery useful suggestions can sometimes be made by the contractor leading to the re-siting of machines to make greater use of a gravity system of conveying feeding stuffs or to secure a more convenient sequence of operations. Frequently barn machinery has been grouped round an engine or tractor driven from a line shaft. Such methods are no longer necessary when an electric motor is used.

Electrical methods of power transmission frequently improve efficiency very considerably. An illustration shows an old line shaft which used to convey the power from a water turbine to the buildings in the background. Eventually the system became so inefficient that most of the barn machinery had to be driven by tractor, often much needed on the land.

A new turbine and generator have now been installed on the same stream and the power transmitted by overhead cables taking the same route as the old shaft. Allowing for the small mill superseding some heavier machinery, there is now sufficient power from the original source to provide a full service for the farm including sterilizing and hot water for the dairy, as well as a complete service for the farmhouse including water heating, cooking and space heating.

Farm buildings vary so much in size and arrangement, that it is difficult to offer suggestions on a method of distribution. The bulk of the power, however, will be required in the dairy and food-preparing buildings, with occasional use of perhaps a portable motor elsewhere for seasonal operations. Some suitable outlet points for such a machine should be considered. If the buildings and other considerations make it convenient, some form of ring main circuit may be an advantage. The principal point is that the whole system should be robust, simple and safe.

One of the questions which comes early to the mind of a contractor about to tackle a farm wiring installation is what system of wiring and what materials shall be used. A good deal of technical research has been devoted to

the production of special cables and accessories to withstand the severe conditions to be found on the farm, and while some additions are needed the present range can, in the main, be commended.

Certainly, material must be tough in every sense. If ferrous metals are used, trouble will be experienced with corrosion in a fairly short period. There is an ammonia laden vapour present on every farm which finds its way into fittings, attacks the wrong sort of fixing clips and will rust away conduit from the inside in a few years however much it is protected on the outside. Yet in parts of a farm conduits have a useful function for mechanical protection, as is shown in the illustration of the mill.

The whole of the cable entries should be made watertight so far as possible by the use of the special glands available. It is a good plan to arrange cable entries at the bottom of switches and fittings on walls, as an added precaution in this respect. In dairies and milking sheds, which are regularly washed down and are invariably damp, it is worth considering how much of the wiring can be kept outside. In many cases it is an advantage for switches to be mounted outside the room or building they serve.

Finally a word on that important person in the execution of a successful farm wiring installation, the electrician who will carry it out. It is perhaps natural that, other things being equal, the countryman will be the most adaptable. He is used to animals and acquires a knowledge of their habits, likes and dislikes and is generally at home when working amongst them and at times over them. He becomes used to working in some isolation and unlike the proverbial plumber develops a knack of getting all his kit of materials and tools together before he starts. He must be able to deal with a certain amount of overhead line and catenary cable work, get used to the rather slow speeds of many farm machines, have an appreciation of their use and output and, who knows, may be called at any time to assist the short-handed farmer with the arrival of a new addition to the farm population, or some other sudden emergency.

Milk Cooling

Advantages of the Chilled-Water System

By C. A. CAMERON BROWN, B.Sc., M.I.E.E.

SINCE the war there has been a considerable interest and activity in providing refrigerated milk-cooling equipment at prices which enable really effective cooling to be available to the small or medium milk producer—the 50 to 100 gallons per day farmer who is probably our bulk producer. Of the various types and methods tried there seems to be clearly emerging a preference for the "chilled-water" system as answering the need for a simple and low-priced cooling equipment.

The chilled-water system consists essentially of a thermally insulated tank containing water which is chilled to some 35 to 38 deg F by an "immersion cooler"—indeed the whole thing is the reverse of an immersion water-heating system. The immersion cooler is simply an evaporating coil fed with refrigerant from a suitable condensing unit mounted on the lid of the tank, below the tank or beside it. Milk is cooled by pumping the chilled water through an ordinary surface-type milk cooler, the milk passing over the cooler.

A most important feature of the application is that such a simple type of cooler can be uncoupled from the water supply, dismantled, washed at the wash-trough and put into the sterilizing chest—the only way of really guaranteeing cleanliness and sterility.

Basically simple, the chilled-water system can be handled in two quite different ways, these alternatives being the subject of debate and discussion. In one way the chilled water is passed through the cooler and away to waste—or to some

other use. At the end of the cooling the tank is refilled and chilling re-started. This method has the advantage that all the water passing through the cooler is at the lowest temperature to which it is chilled and that all the milk passing over the cooler leaves it at a low temperature —say 40 to 43 deg F. On the other hand, the feed of milk to a cooler varies during the times of milking—there may be times when no milk at all is passing over. It is, therefore, more than likely that much of the chilled water passing through will be wasted and there is indeed an ever-present fear that all the chilled water may have gone before all the milk is cooled.

There are two answers to this problem. First of all, a very large volume of water can be chilled, but this, while meeting the possibility of running out of cooling water, does not eliminate the wastage of chilled water—and electricity. The other method is to fit a device to the cooler which will vary the flow of chilled water through it with variations in the flow of milk *over* the cooler. This, however, raises possibilities of complication and trouble, particularly as the cooler must be washed and steamed. Alternatively, a control can be fitted to the milk receiving pan from which milk is fed to the cooler so as to maintain an even rate of flow of milk to the cooler. Apart from the fact that the receiver can quite easily be out of milk altogether, there are prospects of trouble with yet another "control." I think, therefore, that the simpler and sounder system for the farm is true chilled water circulation.

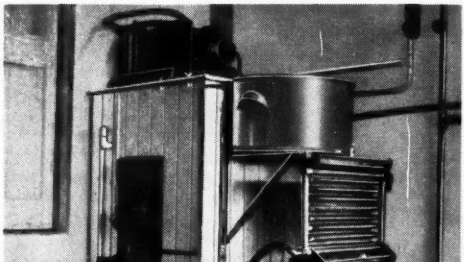
This alternative, and to many preferable, system is the *true circulation* of the chilled water through the cooler and back to the tank again. This eliminates the risk of running out of water and indeed this system actually "uses" no water at all except occasional make-up for spillage as the cooler is disconnected and dismantled—a matter of a pint or two weekly. Admittedly, of course, as the warmed water leaving the cooler is returned to the chilled water tank the temperature of the water in the tank gradually rises. Thus while we cannot run out of water with this system we can, and do, run out of "cold."

What happens is that as cooling proceeds the temperature of the milk leaving the cooler gradually rises. If carried on too far the milk would not be properly cooled at all and it is a matter for the designer and for the advisory officer to match the cooling set to the cooling requirements. Generally a chilled-water cooler is rated at that quantity of milk cooled to not more than 50 deg F, the initial milk coming off at 40 deg F or so. It is, therefore, essential with this type of cooling that all the churns be filled simultaneously and not one after the other. This is done by fitting a "distributor" to the cooler so that cooled milk flows to each churn at the same time. Thus into *each* churn there will be fed milk at a range of temperature from 40 to 50 deg F, giving a bulk temperature in the churn of some 45 deg F.

Mr. Cameron Brown is Agricultural Electrification Adviser to the B.E.A.

There are signs that ample supplies of C.W.C. equipment will be on the market during this year for cooling up to 60-70 gallons per day at prices about, if not below, £100. It is certainly to be regretted that makers of refrigerating equipment did not take up the C.W.C. idea when put to them before the war. If so, at related prices, such sets would probably have then been available at £50 or less. There would, indeed, have been a widespread installation of proper cooling equipment.

While on the subject of pre-war suggestions, some readers may be interested in a note on the historical aspect of the C.W.C. method. The idea was first propounded to the author by J. McLemont, then dairy husbandry adviser to the Reading University Advisory Province. The idea, having attraction, was then put to several of the refrigerating firms, but with no response. The war stopped any



Chilled-water cooling set installed in Cornwall. (*South Western Electricity Board*)

further developments but the author gave the idea a wider publicity by discussing it before the Dairy Conference at Winchester in 1946. The suggestion was there received so enthusiastically that he was encouraged to have the method tried out.

He was successful in enlisting the co-operation of the Cornwall Power Company by which a number of sets were made up and installed on farms. To a smaller, but no less valuable, extent similar steps were taken by the Wessex Electricity Co. and the Shropshire, Worcestershire and Staffordshire Power Co. It was a demonstration of one of the first Wessex sets on an Oxfordshire farm which probably gave the Milk Marketing Board an inkling of what could be done, but the greater extent of installation in Cornwall gave real confidence in the C.W.C. idea. During these early days, too, the Wolseley Company made up a factory-produced chilled-water set. There can, however, be little doubt that the chief credit for putting the C.W.C. idea into accepted use on farms is due to these pre-nationalization supply companies.

Progress in Horticulture

Recent Improvements in Technique

By A. W. GRAY

THE most striking thing about the present-day use of electricity in horticulture is not so much the development of new applications as the outstanding improvements in technique. These applications were known to many and practised by a few enthusiastic engineers and growers years ago, but were not generally accepted by the horticultural fraternity, due partly to economic reasons but primarily to cumbersome techniques.

It is only since the improved methods were developed during recent years that growers and engineers have realized not only the possibilities but the necessity of these aids to an industry which, if it is to play its part in increasing the supply of home-produced foodstuffs and at the same time meet the competition of imported horticultural produce, must not only produce more but much more and of higher quality.

Undoubtedly the greatest advance has been in electrical soil warming and the measure of its acceptance by the horticultural industry can be judged from the fact that individual installations of up to 200 kW are operating economically and efficiently and that the number of growers using installations of the order of 40 to 50 kW is rapidly increasing.

Mains voltage cables have been used for soil warming for a considerable number

of years and still have a place in the scheme of things but it was not until the further development by the Electrical Research Association of the transformer low-voltage method (see E.R.A. reports W/T.7, W/T.7A, and W/T.15) that electricity for soil warming on a large scale became a practical proposition for the market gardener and commercial grower.

Briefly, the technique employed is the energizing of grids of galvanized iron wire from the secondary side of a transformer. Voltages vary according to the size of the installation, from 6 V for the smaller installations, comprised of single wire laid to and fro over the area to be warmed, to 30 V for the large commercial installations where the warming wires are made up into series-parallel grids, and loadings are designed to meet the requirements of the individual installation.

Experience in the handling of large-scale installations has confirmed that the basic principles and design, as laid down in the reports, are sound whether for use in hotbeds, propagating benches or for preheating and maintenance warming of tomato borders in glasshouses, but modifications in handling have been made from time to time as field experience has been gained.

It was apparent from the first that when installing series-parallel grids it would be necessary to provide some form of fixing for the individual wires to ensure not only that the spacing between the wires was maintained but also that the wire was kept at a uniform depth, and in

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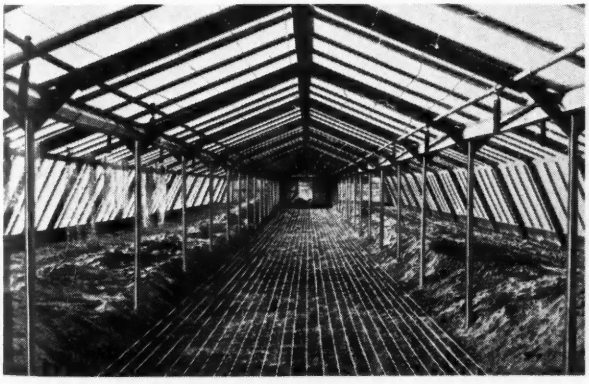
the early installations the wires were first laid in position and then pegged down with wire staples. The wires were, however, liable to disturbance during cultivation of the soil and it was soon realized that some form of tensioning was necessary.

Group straining, whereby all the wires in each section of the grid were tensioned at the same time by means of straining bars, was next tried, and although this was better than the earlier method it still left room for improvement. The next logical step was to provide individual straining for each wire by means of eyebolts from fixed straining bars and this is now the established practice. Eyebolts are provided at one end only for grid lengths up to approximately 60ft and at both ends for longer runs. The depth at which the wires are laid and the loadings employed are regulated by the particular application for which the soil warming is required.

For soil warming in hotbeds the recognized method of regulating the amount of heat put into the soil is by the "dosage" method, running the soil-warming grids for a predetermined number of hours per night. The resultant



Laying series-parallel grids for soil warming tomato beds (*Midlands Electricity Board*)

soil temperature rises and falls in relation to the air temperature and avoids the complication in growing conditions of balancing soil temperature with air temperature and available light such as was introduced by the older method of maintaining a constant soil temperature by thermostatic control.

For hot-bed soil warming in frames, when cultivation is by hand, the grids are laid at 6in to 8in depth, but where mechanical cultivation is employed 9in to 10in is advisable. The loading is 5 W per sq ft and the hours of running, i.e., dosage, vary according to locality—from 40 to 45 Wh/sq ft each 24 hours in the southern half of the country to 45-50 Wh in the northern half; where local conditions warrant these dosages can be increased but all hot-bed soil warming can be "night running" only.

The grids for propagating beds in frames and on benches are laid on approximately 1½in to 2in depth of sand and covered by approximately the same amount, granulated peat being used around *but not under* the pots on the bed; the peat is not required when propagating is carried out in boxes. Loadings of 5W/sq ft are suitable and the bed temperature can be regulated by means of a thermostat or by observation. Propagating cannot be carried on by "night running" only but can well be kept off the major peaks.

The soil warming application with the greatest potentialities for both the supply authorities and horticulturists is the raising of the temperature of the soil in tomato house borders. Pre-warming before planting avoids the possibility of the plants receiving a check from cold soil conditions. This replaces, and at a lower cost, the running of the space heating installation for a considerable period in an endeavour to raise the soil temperature.

When the supply is unrestricted, 6 W/sq ft is a suitable loading and continuous running for a period of 24 to 30 hours will, in all normal conditions, provide the soil temperature required for planting out. When, however, the supply is restricted to off-peak hours it may be necessary to increase the loading up to 10 W/sq ft.

Adjustment of Supply

For maintaining the soil temperature during the growing period "night running" is adequate, but when the higher loading is employed for preheating provision must be made by arrangement of the grid connections or by a tapping on the transformer to reduce the loading to approximately 6 W/sq ft.

Because of the prevalence of mechanical cultivation and *in situ* steam sterilizing of the soil it is essential that the grids in tomato borders in glasshouses should be laid at a minimum depth of 10in and in certain instances it may be necessary to go to 12in to meet local requirements of cultivation.

The precise details of loadings and running times for soil warming under cloches are not available but it is reasonably certain that loadings and running times would be approximately 50 per cent up on those required for hotbeds in frames. Investigations into these problems are being carried out and at present seem to

Electrically heated bath for the warm water treatment of chrysanthemum stools, etc.

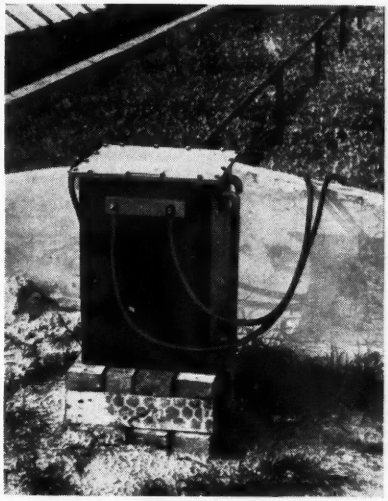
favour this view. A further use for soil warming may well be in maintaining the temperature of the nutrient solution in the beds of hydroponics or soil-less culture, although here plastic-covered cables would appear to be essential.

The natural sequence of thought from soil warming will be to space heating of the glasshouse and here, too, electricity can play a most important part. Nobody who has studied the economics of space heating would for one moment suggest electrical space heating for the large blocks of tomato houses such as are common in the Lea Valley and elsewhere. However, for the well-built, compact propagating house with a high-value output, electrical space heating with its thermostatic control and guaranteed minimum temperature, working in conjunction with a soil warmed propagating bench has a definite place. This combination enables the house temperature to be closely controlled at an economic level of 50 to 55 deg F and root temperatures on the propagating bench to be maintained at 60 deg F.

Tubular heaters, designed especially to withstand the arduous conditions in a glasshouse, have met and do meet the case, but growing interest is being shown by horticulturists and engineers in heating installations utilizing transformers and galvanized iron strip energized at low voltage. Several installations of this nature have been working for a number of years and larger ones more recently completed are giving every satisfaction. The equipment compares at least favourably for first costs with the more orthodox heating units and, being robust and foolproof, should have a long and trouble-free life.

Soil Sterilization

Because of the load value and revenue potential, space heating and particularly soil warming will necessarily take precedence over other uses of electricity in horticulture in the eyes of the electrical industry, but the other applications are just as essential to the grower in his endeavour to get closer control over growing conditions. He has not only to contend with our fickle weather but to wage a never-ending battle with pests and disease and here electricity gives him aids which



(South Eastern Electricity Board

Chrysanthemum cuttings growing in soil-warmed propagating bed under span lights

are sure, economic and easy to control.

For the sterilizing of soil as the base for his propagating and potting composts electricity offers him the sure and economical alternatives of sterilizing by the electrode or the immersion methods, the latter utilizing the improved type heaters recently developed; as a further alternative there is the possibility of using an electrode boiler for producing steam for sterilizing. While at present there are no economic ways of sterilizing glasshouse beds and borders *in situ* by electricity we can be sure that it is an application the possibilities of which have not been overlooked.

The closeness of control possible in water heating by electricity is already being used to provide the critical temperatures necessary for warm water treatment against root pests in chrysanthemum stools, dahlia tubers, strawberry runners and bulbs.

Refrigeration, too, is playing its part and, as well as providing storage for fruit and the holding of flowers and vegetables between cutting and profitable marketing, has made possible the "pre-cooling" treatment of bulbs for hothouse forcing

which results in earlier flowering, giving to the grower the opportunity of competing successfully against imported flowers.

The application of artificial light to growing plants, although only in the early experimental stages, promises eventually to give to the grower, and more particularly the plant breeder, control of plant growth hitherto undreamed of. Even in these early days of the investigations it is certain that when light intensities of between 300 and 600ft-candles are used to extend artificially the "light day" during winter propagating, tomato plants respond enormously during the seedling stage and the benefits are effective right through the growth and fruiting cycle of the plant. The true economic value of this has yet to be proved but the possibilities are, to say the least, interesting.

Much could and should have been written about the use of electric power on the horticultural holding, the possibilities of electrically driven cultivators, the use of small power units for water pumping and circulating, for operating control valves and automatic stokers, spray equipment and grading machines, also the use of better lighting for improving conditions in the potting and packing sheds. These and many other applications which are accepted as indispensable in manufacturing industries, but are absent from the majority of horticultural holdings, provide an opportunity for development of great value to the horticulturist and of equal importance to the supply authorities. It is high time that the engineer and the grower got together to their mutual advantage.

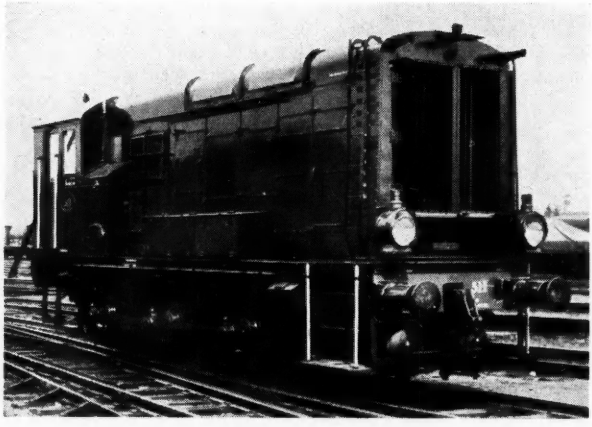
SHUNTING LOCOMOTIVES

At the end of the last war the Netherlands State Railways acquired from the Ministry of Supply a number of 350 b.h.p. diesel-electric locomotives, which had been shipped from England and operated by the British Liberation Army. These locomotives were equipped with English Electric power and electrical plant, the mechanical parts being built by the former L.M.S. Railway Co.

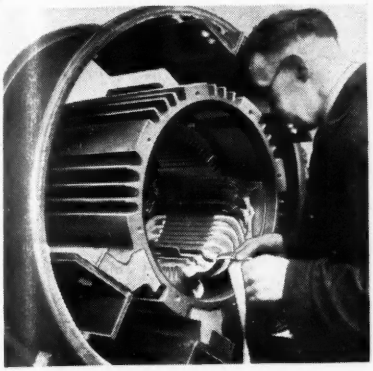
In 1949, following operational experience, the Netherlands Railways placed an order with the English Electric Co., Ltd., for ten complete locomotives of a similar type. The locomotives are equipped with a 6 KT diesel engine, developing 400 b.h.p., and, in addition to the higher output of the power unit, certain modifications have been made to the mechanical structure to suit local requirements.

The engine and electrical equipment are of similar design generally to that of the 250 shunting locomotives which the company has supplied to railway systems in this country and abroad. Power is transmitted from the main generator, which is direct coupled to the engine, to two nose-suspended traction motors driving through double reduction gears. The control equipment is in a desk-type cubicle in the driver's cab, arranged to permit operation from either side of the locomotive. A nickel-alkaline battery is also fitted for motoring the main generator when starting.

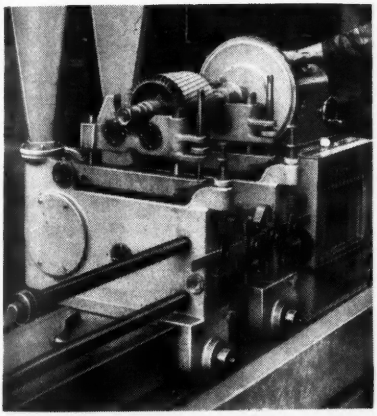
The first of these locomotives was completed and delivered last July, since when it has been in service in the Feyenoord marshalling yard at Rotterdam. The other nine will be delivered this year.



The first of ten 400 h.p. diesel-electric shunting locomotives being supplied to the Netherlands State Railways



Glass fibre taping a 40 h.p. flameproof motor provided with Class B insulation



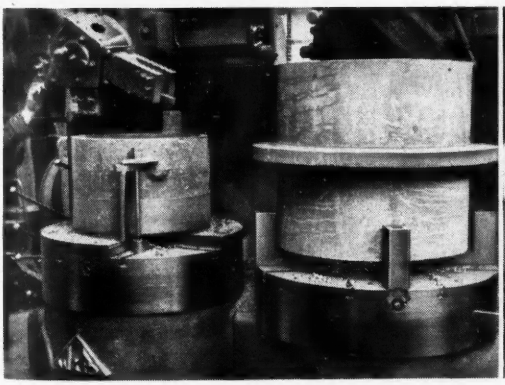
Totally Enclosed Motors

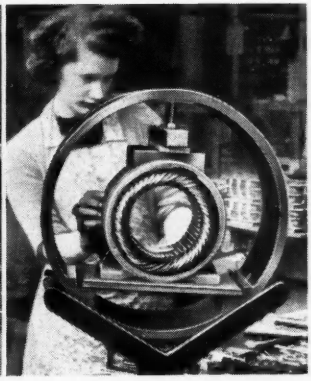
Securing Increased Efficiency and Reduced Costs

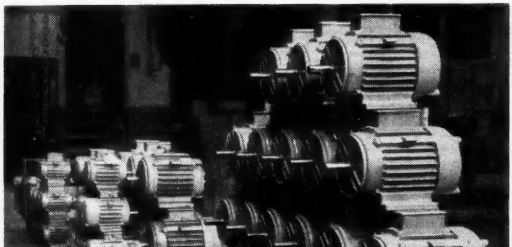
THE use of totally enclosed motors, in preference to the ventilated type, has much to be said in its favour. Not only is reliability increased on account of the impossibility of foreign matter entering the motor, but due to increased efficiency the consumption of electricity and cost of running are reduced. It is claimed that normally this type of motor is 3 to 4 per cent higher in efficiency than the standard industrial machine. With a plant load of 300 h.p., for example, with electricity at 1d per kWh, working forty-hours a week and fifty weeks a year, the running costs would show an annual saving amounting to approximately £115.

Left: Dynamic balancing of rotor for incorporation in an industrial type motor

Below: Boring and turning magnet yokes of 50 h.p. reversing motor and special feed motor yoke for planer equipments, made exclusively for John Stirk & Sons, Ltd., Halifax, and (right) winding the stator of a 1½ h.p. loom motor for textile production







A batch of totally enclosed motors ready for despatch

For most of the forty years of their existence Horace Green & Co., Ltd., have at their works at Cononley, Keighley, Yorks, concentrated almost exclusively on the production of totally enclosed motors, and so greatly has the demand for this type of unit increased recently that work is in hand on an extension which will increase the production area by about 25 per cent.

Especially in demand among the range of motors manufactured which extends from ¼ h.p., 1,500 r.p.m. to 200 h.p., 750 r.p.m., are the "Trislot" motors the construction of which involves the incorporation of three separate squirrel cages giving particularly good starting qualities. The outer cage usually consists of high resistance bars which give the rotor high starting torque and at the same time reduce the starting current. When the motor is at a standstill, the frequency in the rotor is the same as in the stator, but as the rotor gathers speed the frequency falls and this allows the flux to cut the middle cage. As the rotor approaches synchronous speed the flux cuts the three cages and the load is then shared between the three. "Trislot" motors are used extensively for lifts, conveyors, compressors, etc., which require high torque, but are not suitable for speed variation by resistance.

A very considerable proportion of the company's output is for the mining and textile industries. A full range of flameproof types is available and special models are made for textile work. When we visited the works recently an order for over 1,000 loom motors for one mill alone had just been completed. We also saw, besides various types of commutator and fractional h.p. motors, a number of special motors designed to work with insulated couplings for operating horse clipping and sheep shearing machines. A range of suds pumps is also made in three sizes from 5 to 20 gallons per minute. Extensive use is now made of synthetic resin covered wire of 18 gauge and finer; glass fibre fabric is used for taping all mining motors with Class B insulation.

Standard Frequencies

A DAILY experimental service of standard frequency transmissions from the Rugby radio station has been established at the request of the Department of Scientific and Industrial Research by the General Post Office. The service began on 1st February, and the frequencies in use are 60 kc/s, 5 Mc/s and 10 Mc/s.

Transmissions on 60 kc/s should be received throughout the United Kingdom and Western Europe and enable local standards to be calibrated with high precision. Transmissions on 5 and 10 Mc/s form part of an international programme designed to give reliable world coverage on one or other of the frequencies which have been allocated to standard frequency services. As the transmissions of these frequencies from the American National Bureau of Standards, Station WWV, are not always satisfactorily received in the United Kingdom and farther East, it is hoped to learn from the present service to what extent reception in the European area is improved, and to what extent the usefulness of both American and British transmissions has been impaired by mutual interference.

The frequencies, which are to be maintained to within two parts in 10^8 of the nominal values, will be monitored at the National Physical Laboratory, to which all inquiries or comments concerning the transmissions should be addressed.

RECENT INTRODUCTIONS

NOTES ON NEW ELECTRICAL AND ALLIED PROJECTS

Carrier for Globe Fittings

THE "Monocap" carrier for lipless lighting spheres consists of a single plate and does away with sliding parts and locking screws. The sphere can be easily and rapidly fitted simply by tilting slightly and inserting the edge into a semi-circular cut-out in the carrier and then rotating it. Various patterns of the carrier are obtainable from the makers, the BETA MANUFACTURING CO., Valley Road, Shipley, Yorks.

Travelling Iron

The 'Clem" travelling iron made by A.B METAL PRODUCTS, LTD., Ludgate House, 107, Fleet Street, London, E.C.4, has been redesigned to provide instantaneous voltage adjustment, making it suitable for use wherever electricity is available. Its familiar lines have been retained, the new neat voltage change switch being built into the top cover. The retail price is 29s 6d.

Surgical Dressing Incinerator

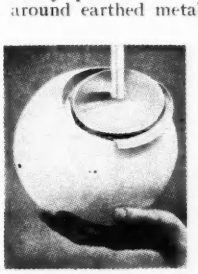
For the rapid, hygienic and convenient disposal of surgical and sanitary dressings EUK CATERING MACHINERY, LTD., Wellington Street, Oldham, has introduced an electric incinerator available in both floor-mounting and wall-fixing models. Refuse placed in a chute revealed by opening a close-latch drop-down door is speedily reduced by a 2 kW element to a fine ash which is collected in a pan in the base. All fumes are removed through a duct. The a.c. model fitted with an automatic time limiting device costs £35. The a.c./d.c. apparatus, with a three-heat switch, sells at £31.

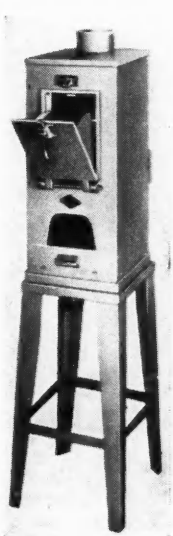
Instantaneous Water Heater

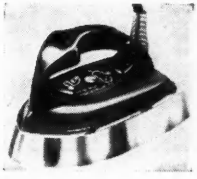
A continuous supply of hot water at 120 deg F at the rate of 1 gal per minute within 10 sec or, alternatively, boiling water at a rate of over 3 pints a minute (based on a water supply temperature of 60 deg F) is provided by an instantaneous automatic water heater made by PATERSON & CO. (LANCS), LTD., Ogden Street, Swinton, Manchester.

The three 3 kW wire-wound elements are situated in a lower glass-lined chamber and are brought into operation by pressing a knob which operates relays, each element having separate sets of contacts and fuses. The electricity is cut off automatically when the water is turned off or reduced to a trickle (to allow for a leaking tap) and cannot be switched on again until the water is turned on and the knob depressed. As a safety precaution the water is turbulated around earthed metal objects to neutralize

Paterson instantaneous water heater







Above: "Monocap" sphere carrier
Right: Incinerator for surgical dressings
Below: "Clem" travelling iron

any electric charge. For fitting on an existing tap, the heater costs 10 gns; complete with tap brackets, etc., it is £1 more.

A small unit loaded at 3 kW and having one-third the output is available for £8 12s, also plus £1 for tap brackets, etc.

Fluorescent Lighting Equipment

It is announced that "Osram" 4ft 40 W fluorescent lamps (natural and daylight) and 2ft 40 W lamps (natural only) are now available from the GENERAL ELECTRIC COMPANY, LTD., Magnet House, Kingsway, London, W.C.2, with earthing straps for use in instant-start circuits. The former lamps are operated with the existing F.8008 instant-start transformer on 200/230 V mains. Another transformer to cover higher mains voltages will be available in the near future.

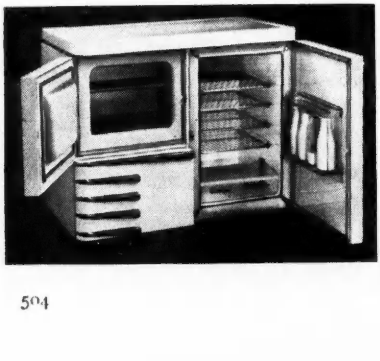
A further new product is transformer F.8012, which is intended for use with the 2ft 40 W lamps, arranged two in series, and is suitable for 220/250 V mains. When used with 4ft and 2ft lamps, both transformers are for inductive circuits only

Two-Compartment Refrigerator

In addition to a 4.2 cu ft compartment for normal domestic food storage purposes the "Duocold" refrigerator has a 1.8 cu ft deep-freeze compartment where perishables such as fresh fruit and vegetables can be stored for many months and frosted foods can be kept indefinitely.

Left: Bulgin radio interference suppressor

Below: "Duocold" refrigerator with deep-freeze compartment



The apparatus is of table-top height (33 in) providing a working space of 40in by 24½in. The exterior finish is of stove and vitreous enamel, with fittings of chromium-plated stainless steel. The interior is vitreous enamel with "Perspex" fittings. A salad crisper is provided and there is a convenient fitting inside the door of the main compartment which eliminates the risk of bottles being knocked over. A press button opens either door and there are no handles. Interior lighting operates automatically. The a.c. model costs £108 10s plus £27 2s 6d purchase tax (United Kingdom only), a small extra charge being made if a d.c. motor is required. The sale distributors are DEEPFREEZE REFRIGERATION, LTD., 193, Baslow Road, Totley, Sheffield.

Interference Suppressors

A radio and television interference suppressor for petrol engine ignition systems is now available from A. F. BULGIN & Co., LTD., By-Pass Road, Barking, Essex. It is arranged for screwing into the distributor head connection socket in vehicles with screw-in ignition wiring. The suppressor has no effect on engine performance and comprises a slightly flexible polythene moulding incorporating a wire-wound resistance.

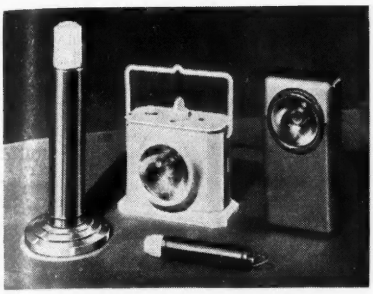
Another such suppressor, but for vehicles with plug-in ignition wiring, is also available.

Lanterns and Torches

Five additions to the range of "Drydex" lanterns and torches are announced by the CHLORIDE ELECTRICAL STORAGE CO., LTD., Clifton Junction, Manchester. They include a metal lantern (price 33s 3d including tax) that gives either a spot beam or general diffused lighting; a plastic handlamp (6s 8d) for general household purposes; the "Wallite" (2s 6d) with a tilting reflector switch for hanging in the cupboard or coal cellar; the "Candelite" (6s 11d) for the nursery or bedside table which is automatically switched on to give a diffused light when picked up; and the "Opalite" (1s 6d), a tiny handbag or waistcoat pocket torch.

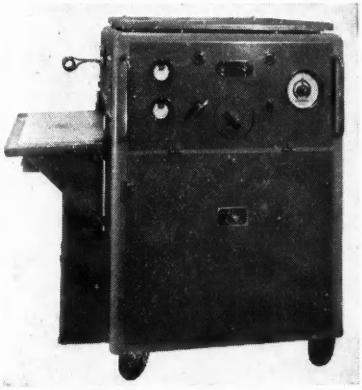
Induction Heating Unit

The latest addition to the range of radio frequency heating equipments produced by E.M.I. FACTORIES, LTD., Hayes, Middlesex, is Model EH.35, a 3.5 kW induction heater, suitable for industrial applications such as soldering, brazing and the surface hardening of small component parts. The equipment is also suitable for certain applications in the manufacture of vacuum tubes, e.g., getter firing, de-gassing and making metal-to-glass seals. The equipment incorporates



"Drydex Candelite," plastic handlamp, and "Wallite" and "Opalite" fittings

E.M.I. radio-frequency heating equipment

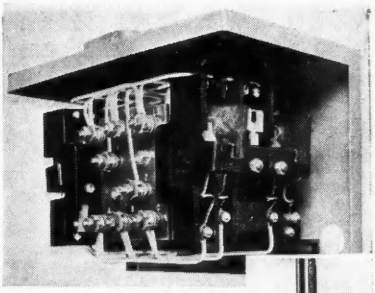


a built-in matching unit for all types of load and has a completely self-contained water supply for the cooling system. Provision is also made for operating a quench valve for hardening processes and the unit is so designed that if required it can be remotely controlled.

Control Equipment

Two additions to the range of "Dupar" control equipment made by DEWHURST AND PARTNERS, LTD., Inverness Works, Hounslow, Middlesex, are the "PD" lightweight pendant push button control unit and the "HBR" air-break contactor pattern hoist block reversing controller.

The former is of robust construction comprising two die-castings in the form of a main box and cover so arranged that with a single screw fixing it accurately positions and registers the push button movements. These are each in the form of a sub-



"Dupar" pendant push button unit and hoist block controller (cover removed)

assembly and provide double circuit features with normally open and normally closed contacts, being primarily intended to provide positive electrical interlocking when used with the "HBR" hoist control unit.

The hoist block control unit is designed for use with squirrel cage motors not exceeding 5 h.p. and is of compact construction while retaining a high degree of accessibility.

Solderless Connections

A method of connecting wires without solder, introduced by the PLESSEY CO., LTD., Ilford, Essex, ensures a reliable joint regardless of the skill of the operator and eliminates all troubles due to heat and flux corrosion. Positive connection is made by crimping two small indentations on opposite sides of the connecting tag by means of the "Breeze" hand-crimping tool. With four sets of interchangeable dies, this tool will crimp any conductor of outside diameter between 0.106in and 0.192in with a single closing of the pliers. Where it is required solely for factory use it can be operated by a foot control.

Glow Starter Switch

A glow starter switch for use in fluorescent lighting control gear developed by OMEGA LAMP WORKS, LTD., Rodney Place, Merton Abbey, London, S.W.19, has just gone into regular production. The normal striking time at 230 V is 1.5 to 2.5 sec and every switch is tested to strike at 180 V. It can be used on 30, 40 or 80 W installations.

NEXT WEEK'S EVENTS

Monday, 20th March

BIRMINGHAM.—Grand Hotel, 6.15 p.m. Birmingham Electric Club. Annual general meeting. "Engineering Odds and Ends," by Dr. E. H. Norgrove.

CHESTER.—Town Hall, 6.30 p.m. I.E.E. Mersey and North Wales Centre. "Overhead Line Regulations," by H. W. Grimmitt. (Joint meeting with the North-Western Centre and the Chester Engineering Society.)

LONDON.—Savoy Place, W.C.2. Institution of Electrical Engineers. Convention on Electric Railway Traction. (Continued on following three days.)

St. Ermin's Hotel, S.W.1, 6.50 p.m. A.S.E.E. Central London Branch. "Industrial Lighting and Decoration Practice," by T. S. Jones.

NEWCASTLE-ON-TYNE.—King's College, 6.15 p.m. I.E.E. North-Eastern Radio and Measurements Group. "The B.B.C. Short-Wave Transmitting Station at Skelton," by S. A. Williams.

READING.—Great Western Hotel, 7 p.m. I.E.E. District meeting. "Trends of Development in Line Communication," by Dr. W. G. Radley.

STOCKPORT.—White Lion Hotel, Underbank, 8 p.m. A.S.E.E. Stockport Branch. Film lecture, "Radar Goes to Sea."

Tuesday, 21st March

CAMBRIDGE.—Cambridgeshire Technical College, 6 p.m. I.E.E. Cambridge Radio Group. Lecture on "The Acoustics of Studios and Auditoria," by W. Allen.

LIVERPOOL.—Mersey and N. Wales Electricity Board, Whitechapel, 6 p.m. I.E.S. Liverpool Centre. "Lighting on R.M.S. *Queen Elizabeth* and R.M.S. *Caronia*," by T. Cotten.

LONDON.—Lighting Service Bureau, 2, Savoy Hill, W.C.2, 6.30 p.m. Association of Supervising Electrical Engineers. "Electrical Installations and Equipment in Modern Aircraft," by A. N. Irens.

MANCHESTER.—Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Measurements Group. "An Instrument for the Measurement of Rate of Change of Power-System Frequencies," by Dr. E. Bradshaw and M. Z. Tanyeloglu.

Wednesday, 22nd March

EDINBURGH. — I.E.S. Edinburgh Centre. Annual general meeting and dinner.

LIVERPOOL.—Philharmonic Hall, Hope Street, 6.45 p.m. I.E.E. Mersey and North Wales Centre. Faraday Lecture on "Radar," by Dr. R. A. Smith.

STONE.—Post Office Central Training School, Duncan Hall, 7 p.m. I.E.E. North Staffordshire Sub-Centre. "Personnel—their Selection, Training, Appraisement and Promotion," by Col. C. E. Calveley.

Thursday, 23rd March

EDINBURGH.—North British Station Hotel, 7 for 7.30 p.m. I.E.E. Scottish Centre. Annual dinner.

HULL.—Y.E.B. Offices, Ferensway, 7.30 p.m. I.E.E. North Midland Centre. "Management and the Engineer," by W. H. Dunkley.

LEEDS.—Lighting Service Bureau, 24, Aire Street, 6 p.m. I.E.E. North Midland Education Discussion Circle. Discussion on "The Teaching and Functions of Mathematics in Electrical Engineering Courses," opened by W. Paterson.

LONDON.—Savoy Hotel, W.C.2, 6.30 for 7 p.m. Electrical Wholesalers' Federation. Annual dinner.

London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, 6.30 p.m. British Institution of Radio Engineers, London Section. "High Performance Television Monitors," by J. E. Jacob.

NOTTINGHAM.—East Midlands Gas Board, Parliament Street, 5.30 p.m. I.E.S. Nottingham Centre. "The Problems Associated with Underground Lighting in British Coal Mines," by D. A. Strachan.

Friday, 24th March

BIRMINGHAM.—Imperial Hotel, Temple Street, 6 p.m. I.E.S. Birmingham Centre. Presidential address by Dr. J. N. Aldington.

NEWCASTLE-ON-TYNE.—King's College, 7 p.m. I.E.E. North-Eastern Students' Section. The Students' Lecture. "Patents and the Electrical Engineer," by L. H. A. Carr.

SHEFFIELD.—Royal Victoria Station Hotel, 7 p.m. I.E.E. Sheffield Sub-Centre. Annual dinner and dance.

EXHIBITIONS

6th-25th March

MANCHESTER.—Central Library. Institution of Electrical Engineers, North-Western Centre. Jubilee Exhibition.

7th March to 1st April

LONDON.—Olympia. *Daily Mail* Ideal Home Exhibition.

Guide to Careers

THE Appointments Department of the Ministry of Labour and National Service, in consultation with the Central Youth Employment Executive, has issued a book, *Careers Guide: Opportunities in the Professions and in Business Management*, which is intended to help young men and women in their choice of a professional, technical or business career, and also boys and girls still at school. Over 100 professions and callings, arranged in alphabetical order, are covered by the handbook. Short notes are also devoted to careers particularly suitable for university graduates, and to employment in nationalized industries and in overseas countries of the British Commonwealth. Copies of the book can be obtained from H.M. Stationery Office (2s 6d net, 2s 9d post free)

TAX ON LIGHTING FITTINGS

Commissioners' Definitions

IN agreement with the Electric Light Fittings Association, the Commissioners of Customs and Excise have issued a memorandum on the liability to purchase tax under Group 14(a) of certain lighting fittings as supplementary to that already given in Notice No. 78. This reads as follows:—

1. FLUORESCENT LIGHTING FITTINGS: *Not chargeable.*—(a) Fittings having plain unfigured side screens of glass or plastic which are open at the ends and do not enclose the lamp; (b) Fittings, without decorative features, having plain clear screens of glass or plastic, whether the lamp is enclosed or not; (c) Fittings, without decorative features, having opaque side screens; (d) Plain industrial opal plastic trough reflectors. *Chargeable.*—(e) Fittings with translucent side screens and closed ends; (f) Fittings, with or without closed ends, having translucent or clear side screens which are ribbed, hammered, figured, fluted or decorated; (g) Fittings with translucent side screens which enclose the lamp.

2. LAYLIGHTS, ETC.: *Not chargeable.*—(a) Laylights, designed to be built in to, and form part of, the ceiling, whether decorative or plain and whether glazed or louvred; (b) Industrial reflector fittings, made to recess into the ceiling (popularly known as "Troffers"), whether open, glazed or louvred. *Chargeable.*—(c) Suspended laylights and "box" fittings; (d) Fittings attached to the underside of laylights as boxes, ceiling fittings or pendants, whether the laylight itself is chargeable or not.

3. LOUVRES: *Not chargeable.*—(a) Plain louvres sold as part of a non-chargeable fitting. *Chargeable.*—(b) Louvres sold separately; (c) Louvres sold as part of a chargeable fitting. (Where a decorative louvre or diffusing attachment is sold with a plain basic lighting unit tax is chargeable on the fitting as a whole, irrespective of whether or not the lighting unit itself is chargeable when sold separately.)

4. SPARE GLASSWARE: *Not chargeable.*—(a) Spare glassware (plain, clear and prismatic) for non-chargeable fittings. *Chargeable.*—(b) Spare glassware for chargeable fittings; (c) Spare opal glassware and other glassware of kinds used for both chargeable and non-chargeable fittings.

FRENCH DOMESTIC APPLIANCES

Few Novelties at Annual Salon

(From Our Paris Correspondent)

THE annual Salon des Arts Menagers, the French equivalent of the Ideal Home Exhibition, is the occasion for manufacturers to produce their novelties, but this year there were few of these. Prices were high and it is understood that although the Salon was well attended, business was not brisk.

Visitors were interested in small electric cookers of the table variety comprising an oven and two hotplates. These cookers, costing just over £20, are about 1½ft high and not quite so wide; they can be used on 115, 125, 195, 225 and 380 V mains. The makers are Calux, 23, Rue de la Mare, Paris XX. There were also several cheaper 900 W models with only one hotplate and a much narrower oven. These appeared to lack robustness, but proved attractive to many people. (Les Procédés, 68bis, Rue Pelleport, Paris XX).

A combined 1,000 W hotplate and grill, also specially designed for small apartments or single rooms, attracted some attention. The makers (Clin, 14 Avenue de la République, Paris II) claim that in spite of its small size it is large enough to prepare a meal for four people.

Clothes-washing machines offered no real novelties. Gallay (Electrogal, 166, Rue de Fbg. St. Honoré, Paris) showed a washer in which the opening is placed at the side more or less on a level with the arms of an average person, so that the washing can be placed in the machine and taken out without bending.

A washer exhibited by Lavix (60-62, Boulevard Eugene-Reguillon) is not a com-

plete machine but a small electric motor which can be plugged into a lighting socket. The motor has an arm with blades for insertion into the copper or whatever receptacle is generally used for boiling clothes. In this way the clothes are washed mechanically for an initial outlay of about £15.

Nordia (4, Cité Griset, Paris XI) again showed their storage radiator which is built in sections so that it is possible to increase or reduce the size. The idea is not new, but Nordia have improved the construction of the apparatus and introduced a newly designed element. Electricity charges are now so high in Paris, however, that except where advantage can be taken of a special tariff when an electric cooker is also used, the cost of running a radiator is more than most people can afford.

District Heating

SOME of the reasons why district heating is considered to be very suitable for new towns in this country are stated in a paper Mr. A. E. Margolis submitted to the Institute of Fuel last week in London.

British schemes could employ turbo-generators exhausting against a very low back-pressure and distribute hot water so that the power and heating loads could be balanced by hot-water storage. The output of electricity and annual load factor of power stations might be increased thereby and the economy of heat-electric operation improved. Gas and electricity could do little for district heating because of their poor annual load factor and the high capital charges on the additional plant capacity which would be required.

The introduction of heat-electricity generation was of growing importance to electricity supply, because condensing power stations were approaching the limit of thermal efficiency, the fuel cost was continuously increasing, the fuel demand was rapidly growing, and it was becoming difficult to find suitable sites for condensing stations with a sufficient supply of cooling water.

Hitherto the main difficulty in combining heat and electricity generation had been due to the variation of heat and power loads; to-day, said the author, this could be overcome by the installation of large-capacity hot-water accumulators. The flexibility of heat-electric stations could be further increased by the installation of air-blast coolers. By combining exhaust-heat storage and thermal-electric storage, the range of district heating service could be extended to isolated groups of buildings, even to villages far away from the heat-electric station.

The application of district heating to a new town with a population of 40,000 was examined in technical outline, and the economy of such a scheme shown. A heat-electric station with a total electricity generating capacity of 60,000 kW, operating at an annual load factor of 58 per cent and an average thermal efficiency of 76 per cent, might save an annual quantity of coal amounting to as much as 79,000 tons.

Trailing Cables

THE Standard Specification relating to trailing cables for mining purposes (B.S. 708 : 1949) has now been revised. Some types of cable have been omitted and new ones specified, while a new section is included on cables for use with remote control. The Standard now demands spark testing as an alternative to the tests for over-voltage and insulation resistance, the outer tough rubber sheath being required to meet a test for fire resistance. A colour scheme has also been introduced to identify the cores.

The document is in four parts dealing respectively with trailing cables for coal cutters, conveyors and loaders, drills, and for use in remote control circuits. Constructional details are set out for the standard types of cables, including dimensions of conductors, and requirements for protective screens and insulation, together with specifications for fire resistance and overall dimensions of cables. Tests are also included for the thickness of insulating material and rubber sheathing, for over-voltage and insulation resistance on the core and the finished cable, for tinning of copper wires, for galvanized coats of armour wire, and for the resistance of cable to flame.

Copies of this publication may be obtained from the British Standards Institution, Sales Dept., 24/28, Victoria Street, London, S.W.1, price 3s post free.

Coventry Electric Club

IN a lecture delivered recently at the Coventry Electric Club, when Mr. F. W. Godden, president, was in the chair, Mr. G. H. Watson (Marconiphone Co., Ltd.) dealt at considerable length with the methods at present employed to enable television receivers to be manufactured and sold at the current low price levels.

The lecturer also dealt with aerials and showed the importance of correctly matching the aerial to the site in order to obtain a correct balance between sound and vision strength and also picture quality. Great interest was shown in a camera tube which the lecturer brought with him from the E.M.I. laboratories.

CONDITIONS IN NEW ZEALAND

Electrical Production and Imports

CONSIDERABLE details of the industry and trade of New Zealand are contained in the report (dated July, 1949) on economic and commercial conditions in the Dominion by Mr R. Boulter, formerly United Kingdom Senior Trade Commissioner in New Zealand (H.M. Stationery Office, 3s), and there is much to interest British electrical manufacturers.

Dealing with the development of manufacturing industries, Mr. Boulter states that on the electrical side production has commenced or preparations are under way for electric motors and transformers, compressors and condensers. Sufficient radio sets, cooking and heating appliances and electric general-service lamps are produced to meet requirements. There is some production of electric irons and a considerable manufacture of domestic refrigerators, washing machines and vacuum cleaners; the use of refrigerated cabinets of local manufacture has increased widely. New factories are in operation or under construction for making batteries, and plans are in hand for the manufacture of electricity meters. In the ceramic industries the manufacture of insulators and electrical porcelain has been extended in range.

Since the beginning of 1948 there has been some slackening in the pace of industrial expansion because of adverse local conditions, but progress has continued.

Imports Mainly from U.K.

The bulk of imports of electrical goods and apparatus and machinery are from the United Kingdom, its share of the total of £7,219,123 in 1948 being £5,516,909. The figures for 1947 were £6,669,844 and £3,937,677 respectively. There is a big demand for motors. In January, 1948, the number of motors in use on farms was 88,282. The smaller sizes form a large proportion of the total imported. The total value of motor imports rose from £778,988 in 1947 to £1,003,852 in 1948, and the United Kingdom's share increased from £424,383 in 1947 to £693,259. The strongest competitor, the United States, lost ground, its share falling from £162,289 to £131,942. Local manufacture is confined to one firm which produces only sizes of between 1 and 2 h.p. Some interest has been displayed in electronic apparatus for use in industrial processes. High-frequency heating equipment is made on a small scale in New Zealand.

Market Changes

After an exceptional demand for vacuum cleaners in 1947, to meet an acute shortage, imports have declined. The value of imports in 1947 was £705,188, of which the United Kingdom supplied £679,646. In 1948, however, imports fell to £204,036 (United Kingdom share £181,483). Similarly the value of imports of refrigerators fell from £257,029 in 1947 to £135,804 in 1948. The United States was the principal supplier with a value of £178,350 in 1947 and £95,598 in 1948; the United Kingdom's shares for the two years were £29,894 and £23,440.

Washing machines have come into much wider use in recent years, and the value of imports rose from £26,564 in 1947 to £80,833 in 1948, supplies from the United Kingdom rising from £10,121 to £66,411. The capacity of local industry is sufficient to supply requirements of smaller domestic apparatus such as radiators, toasters, immersion heaters, irons, hotplates, etc. and imports in future will be increasingly confined to components and materials.

Imports of electric lamp bulbs also rose from £80,198 in 1947 to £136,648 the United Kingdom increasing its share from £47,002 to £84,179. Imports consist mainly of glass bulbs for completion in New Zealand factories. The lamps imported complete are for automobiles and torches.

Practically all the imported insulated cable and wire comes from the United

Kingdom, its share of the imports for 1947 (£1,521,715) being £1,448,508 and for 1948 £1,463,734 out of total of £1,522,896. Imports of cable are likely to increase in order to meet requirements for transmission lines, telegraphs and telephones, and the extension of railway electrification, though there may be a slight decrease in imports of rubber-insulated cables. For 220 kV transmission steel-cored aluminium cable is used. Local production of wires and flexible cables has commenced and will be increased in volume and widened in range if plans for a new factory of a fairly large size materialize. A considerable extension has taken place in the production of electrical porcelain and accessories such as switches, ceiling roses, sockets, plugs, flush-plates, fuses, cord-connectors, etc.

The value of imports of telephone apparatus in 1948 was £982,174, and the United Kingdom's share was £830,703. The programme of extension of the telephone service now in course of execution will ensure a continuation of imports for some years. While the bulk of the trade is in the hands of United Kingdom manufacturers, the prospects of retaining this position would be materially enhanced if prices could be lowered and deliveries expedited.

The manufacture of radio receiving sets in New Zealand has reached a point where all usual requirements can be met, and a considerable range of components for assembly is now produced. Valves, however, are not made locally, and imports during 1948 totalled £91,444 in value. The principal suppliers were the United States (£39,696) and the United Kingdom (£31,122).

Hydro-electric Development

The possibility of supplementing hydro-electric power by steam generating plant using oil or coal has been considered and rejected owing in part to difficulties in obtaining supplies. Under present conditions some restriction of power consumption is necessary at certain seasons of the year, and new enterprises requiring an electricity supply are subject to careful examination.

A programme for providing increased generating capacity has been drawn up and will require several years for its execution. Work is proceeding upon the construction or extension of a number of power stations. Of these, the station at Maraetai, on the Waikato River, is intended to be the first of a series on this river. Work has been started on one at Whakamaru, and investigations upon two others at Waipapa and Atiamuri are being pursued. The output from the Maraetai station will be 200,000 kW. Plans are in hand for a still larger station at Roxburgh on the Clutha River.

Hitherto United Kingdom manufacturers have supplied the greater part of the equipment installed though they were unsuccessful in obtaining the principal contracts for the Maraetai station. Competition of the keenest nature may be anticipated from manufacturers in the United States, Canada, Sweden and Switzerland.

Telephone Expansion

An agreement was concluded in 1946 between the Post and Telegraph Department and a group of United Kingdom manufacturers for the supply of telephone equipment over a period of four years. Large orders have been placed for such items as manual telephones, automatic telephones, and exchange equipment. Some years will elapse before the Department's full programme for conversion of exchanges to automatic working can be completed. The decision to adopt the "step-by-step" system gives an opening of great value to United Kingdom manufacturers of telephone equipment.

In the larger cities electric tramways represent the greater part of public passenger transport. Plans for the change-over to trolley-buses made by five municipalities began to be implemented in 1949. The supply of chassis and the overhead equipment presents an opportunity for British manufacturers and substantial orders have already been placed.

N.S.W. Engineers' Association

WE have received from the Electricity Supply Engineers' Association of N.S.W. a copy of the Proceedings of the Association's twenty-fourth annual conference held in February last year in Sydney. Besides the technical papers and discussions, mainly on rural subjects—rural electricity surveys, economic methods in rural electricity and protection of rural electrical distribution lines—there are contributed articles on varied subjects.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

Overhead Line Planning Permissions

IN his letter in your issue of 24th February the Rev. H. H. Symonds suggests that there is considerable doubt among members of Planning Committees regarding the planning permission for overhead lines under the Town and Country Planning Act, 1947.

It is not clear why this doubt should exist as the application of Section 35 of that Act and the procedure to be adopted under it were fully set out in Circular No. 61 sent out to all local authorities by the Ministry of Town and Country Planning on 25th October, 1948.

The intention of the Minister of Fuel and Power to adopt the procedure under Section 35 of the Planning Act in the case of applications "for consents to the placing above ground of electric lines under Section 10(b) of the Schedule to the Electric Lighting (Clauses) Act, 1899," was made known to the Central Authority and to all Area Boards in a letter sent to them on 9th February, 1948.

The answer to Mr. Symonds' specific question to me, therefore, is that the Minister of Fuel and Power has by the issue of Circular No. 61, referred to above, operated the "deemed planning procedure" of Section 35 of the Act.

L. J. LUFFINGHAM,
Public Relations Officer,
British Electricity Authority.
London, W.1.

Floodlighting Football Grounds

IN your 17th February issue you reproduced a photograph showing the Ipswich Town Football Club's ground illuminated at night-time. In 1926 we illuminated a football ground at the Brewood Flower Show, when the Inniskilling Fusiliers gave a demonstration of football played with motor cycles and side-cars. The illumination was carried out by twenty Holophane floodlighting units on poles 25ft high. It was a pronounced success, free from shadows, and enabled the game to be carried on at night-time at a very fast speed.

On the same page, you mention gas showroom lighting. We are at the present time carrying out the electrical installation for the Walsall gas showrooms.

H. F. TRUMAN
Walsall. (Truman Electrical Co.).

Load Flow Calculations

I WAS interested to read that Mr. G. W. Maxfield uses the same method of load flow calculations as myself. He also asserts that this method has been developed much further during recent years, but unfortunately does not give particulars of these developments.

The recent correspondence under this heading has, however, developed into the question: "Are network analysers really necessary?" I think they are. It has been argued that these devices are very costly and difficult to operate. This is true of analysers of the type owned by the A.E.I. at Willesden, but it is unnecessary to install elaborate instruments of this sort in every office where load flows are calculated.

It is not generally realized just how much can be done when applying a d.c. calculating board to a.c. supply problems. Loads of widely differing power factors can be dealt with by measuring watt and var flows separately; a fairly accurate estimate of the effects of cophasal or quadrature boost can even be obtained by inserting a proportionate voltage into the network at the point of boost. The resulting circulating currents are measured on the calculating board and their phase angles calculated by assuming an average impedance angle for the network.

I have recently constructed the prototype of a d.c. calculating board which can be set up rapidly and does not re-

quire a special operator. It comprises twenty line units and eighteen load units and the total time required to set up a problem is less than a quarter of an hour. The currents in the network can subsequently be read off as quickly as they can be written down. Admittedly this instrument is too small for many problems met with in practice, but the time required to set up a larger model should not be appreciably greater. A brief description of this model may be of interest to readers.

The line and load units consist of toroidal rheostats having resistances of 50 to 50,000 ohms respectively. These units are connected to a common plug board where they can be joined by means of plugs and sockets to form a model of the system under review. Multi-contact spring loaded push button switches are provided on the plug board and arranged so that a milliammeter can be inserted into the circuit of each line, or load unit, as required. When these switches are in their normal position a compensating resistance equal to the ammeter resistance is left permanently in circuit. The power level is purposely kept low to reduce errors; for example, one milliamp generally represents one MVA on 33 kV systems. Power is obtained from the mains through a transformer and metal rectifier, giving an output of 200 mA at 100 V d.c.

Supply systems do not always have impedance characteristics sufficiently similar to treat on a d.c. board, but it is doubtful if these are numerous enough to justify many elaborate a.c. analysers. Nevertheless, I believe it would be possible to design a simplified version something on the lines of the d.c. board described above.

J. B. McPHERSON.

Tranent, East Lothian.

I.E.E. NOTTINGHAM DINNER

SPEAKING at the annual dinner of the East Midland Centre of the Institution of Electrical Engineers at Nottingham on 10th March, Mr. C. R. King, chairman of the East Midlands Electricity Board, said that his Board would give the Institution every possible support, particularly in its educational and training work, in addition to supporting the training schemes of the British Electricity Authority and Area Boards. At the moment they had over 20 graduate trainees. They were also ready to participate in a scheme for training craftsmen. It was his desire that every man employed by the Board, no matter how lowly his position, should have the opportunity of rising to the topmost positions in the industry.

Remarking that the Board had had "reasonably satisfactory" results during its first financial year, Mr. King said it was hoped that it would do even better next year. He could say sincerely that every man in the electrical industry would give of his best for the good of the country.

Replying to the toast of "The Institution of Electrical Engineers" which Mr. King had proposed, Mr. H. Bishop, vice-president of the Institution and chief engineer of the B.B.C., referred to the progress of television and said that although the Sutton Coldfield station had had "teething troubles," it was now going well and giving pleasure to between 7,000,000 and 8,000,000 viewers.

The institution was now the largest engineering organization in the world; its membership had reached 35,000.

Mr. A. Latham, chairman of the Centre and Mansfield district manager, No. 1 Sub-Area, E.M.E.B., proposed the "City of Nottingham." In response, the Lord Mayor (Ald. W. Sharp) recalled that it was just seventy years ago that the first electric street lamps were erected in Nottingham.

Mr. E. G. Phillips, past chairman of the Centre, proposed "Our Guests," and Mr. D. J. Bell, general manager of the Tube Works, Stewarts and Lloyds, Ltd., Corby, responded.

World Power Conference

FORMS of application for membership, with copies of the provisional programme of the fourth World Power Conference to be held in London, 10th to 15th July, are still obtainable from the Conference offices at 414, Cecil Chambers, 76, Strand, London, W.C.2. Some of the post-Conference study tours are full up, but there are still vacancies in certain of these tours and the day and half-day excursions from London.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE travelling scholarship awards for 1949 have been announced by the **Worshipful Company of Tinplate Workers, Alias Wire Workers.** The first prize has been awarded to Mr. H. Dixon (British Insulated Callender's Cables, Ltd.), the second prize to Mr. R. E. Durling (W. T. Henley's Telegraph Works Co., Ltd.), and the third prize (tied) to Messrs. K. P. Baldy (International Combustion, Ltd.) and J. W. Hunter (I.C.I. Metals, Ltd.).

Mr. G. H. Hirst has been appointed by the St. Helens Cable & Rubber Co., Ltd., as assistant area sales manager and engineer for Yorkshire. Mr. Hirst received his technical education at Dewsbury and Bradford Colleges of Technology, and served his apprenticeship with the Yorkshire Electric Power Co. Subsequently, he was appointed assistant outside engineer to George Ellison, Ltd., attached to their Leeds branch. From 1939 to 1945 Mr. Hirst served with the Royal Artillery both at home and abroad.

Mr. H. C. Towers, M.I.E.E., M.I.R.S.E., deputy chief engineer (signals), Bombay, Baroda & Central India Railway, was leaving India on 13th March for eight months' leave in the United Kingdom. His address will be c/o Mrs. Hunt, 3, Kendola Road, London, S.W.4.

Mr. A. J. Hodgkinson, A.M.I.Mech.E., Associate I.E.E., A.M.I.Struct.E., has been appointed to the position of generation engineer (construction) in the Yorkshire Division of the British Electricity Authority in succession to the late Mr. G. B. Melton. Before his appointment Mr. Hodgkinson was on the generation construction staff of the Division.

Sir Robert Sinclair, K.C.B., K.B.E., president of the Federation of British Industries, was nominated on 8th March at the meeting of the Grand Council for a second year of office. This nomination will come before the annual general meeting of the Federation in April.

Mr. J. M. Hallett has been appointed sales manager of the Domestic Appliance Department of Ferranti, Ltd., and **Mr. J. E. Schofield,** who until recently has been seconded for special duties, has again taken up his appointment as sales manager of the Clock Department. **Mr. T. Ogden** has been appointed sales manager of the Ferranti foundry.

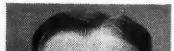
Mr. C. W. Flint, A.C.A., formerly chief accountant of the South West Scotland Electricity Board, has been appointed chief accountant of the East Midlands Electricity Board to fill the vacancy caused by the death of Mr. J. S. Nodes.

As we have already announced, **Mr. G. Hamilton,** F.R.I.C., A.R.T.C., relinquished his executive duties as general manager, B.T.H. Lamp & Glass Works, on 31st October last. On 3rd March, Mr. E. H. Ball (managing director of the British Thomson-Houston Co.), presented a television receiver to Mr. Hamilton on behalf of his friends and colleagues, many of whom had congregated at the Rugby works from far afield to witness the ceremony and express to Mr. Hamilton their good wishes on his retirement after thirty-eight years' service with the company. The accompanying picture shows Mr. Ball (centre), Mr. Hamilton (left) and Mr. S. R. Eade, M.I.E.E., manager, British Thomson-Houston Co.'s Lamp Factories.

Mr. G. Hamilton being presented with a television receiver from his former B.T.H. colleagues, at the company's Rugby Works

Mr. W. Balfour has been appointed engineer-in-charge of the B.B.C. studio centre and transmitting station at Aberdeen. He succeeds **Mr. W. W. Inder,** who has retired after seventeen years' service. Mr. Balfour joined the B.B.C. from the G.P.O. radio station at Portishead in 1934, and has since had wide experience in the Transmitter Department of the Engineering Division.

Ald. G. A. Stillingfleet, of Brighouse, Yorkshire, has accepted an invitation to be the next Mayor of Brighouse. Ald. Stillingfleet is proprietor of the firm of Stillingfleet and Harper, electrical engineers, managing director of Home Wireless Service, Brighouse. He has occupied many public offices in the town.



Ald. G. A. Stillingfleet

Mr. A. Apps, managing director of S. W. Blight, Ltd., of Canterbury, has been elected chairman of the East Kent Branch of the Electrical Contractors' Association for the fourth year in succession.

Mr. J. Magee, accountant, the No. 7 (Grimsby) Sub-Area of the Yorkshire Electricity Board, has retired. Mr. Magee entered the service of the Grimsby Corporation in 1909 and after serving in the 1914-18 was took up an appointment as chief clerk and accountant in the Electricity Department.

Mr. R. D. Trotter, B.Sc. (Eng.), has been appointed second assistant technical engineer, B.E.A. London Division. Mr. Trotter joined the staff of the Central Electricity Board (S.E. & E. England District) in 1946 after completing training with the British Thomson-Houston Co., Ltd., at Rugby, and a period of service with the Royal Navy.

Mr. A. N. D. Kerr, A.M.I.E.E., has been elected president for 1950 of the Old N'Ions Association (past day students of the Northampton Engineering College, St. John Street, London, E.C.1). Mr. Kerr, who came down from the College in 1927, is a Kitchener Scholar and a Cromptonian. He is London manager of the Electrical Power Engineering Co. (Birmingham), Ltd., and is a member of the Executive Council of the Association of Supervising Electrical Engineers. In 1947 he gained first prize in the A.S.E.E.'s W. E. Highfield Shield Competition for his paper on "The Sales Engineer in Industry." The hon. secretary of the Association, Mr. J. Mortimer Hawkins, 115-117, Cannon Street, London, E.C.4, would welcome news of any Old N'Ions.

Mr. E. P. Peregrine, B.Sc., A.M.Inst.C.E., A.M.I.E.E., A.M.I.Mech.E., has become a partner in W. A. Turner, Jeffrey & Co., consulting engineers, Royston, Herts, and the style of the partnership has been changed to "Peregrine & Partners (incorporating W. A. Turner, Jeffrey & Co.)" For the past four years Mr. Peregrine has been chief research engineer to the Parsons & Marine Engineering Turbine Research & Development Association.

A social evening for employees of the **Phoenix Telephone & Electric Works, Ltd.,** was held on Wednesday last week at the company's works canteen, Edgware Road, London, N.W.9, which was attended by over 500. In addition to dancing there was an excellent cabaret in which well-known artists appeared. During the evening long-service awards were made to employees who had been with the company for twenty-five years or more. Mr. E. N. Epstein (director) in introducing Mr. E. Van Gelder (director and general manager) mentioned that Mr. Van Gelder, with Mrs. Van Gelder, was shortly leaving for Australia on the company's business. Mr. Van Gelder, in reviewing the company's growth, thanked them for their co-operation. The awards were presented to thirty-four employees by Mrs. O. Epstein, a director and daughter of the founder of the company.

Nearly 600 guests of **Chloride Batteries, Ltd.,** were at the Plaza Ballroom, Manchester, on 2nd March, for the first post-war cabaret and dance held by the Exide Manchester depot. Among the guests were many executives of the company, including a strong contingent from the Exide Works and the London office, as well as many northern motor and radio traders.

The annual dinner of the **ex-Johnson & Phillips Association** was held at Grosvenor House, Park Lane, W.1, on 4th March, when ninety-six members of the Association from all parts of the country attended. The toast of the Association was given by Mr. H. G. Bennett, managing director of the Trafalgar Engineering Co., and the chairman, Mr. A. J. Shrosbery, managing director of T. Clarke & Co., Ltd., said there was a record attendance. He asked all members to help to increase the membership of the Association. Applications should be sent to Mr. H. D. Parsons, hon. sec., "Heigham," 20, Beaumont Road, Orpington, Kent. The dinner was attended by members of the Johnson & Phillips board: Mr. J. L. Wates, chairman and joint managing director, Mr. W. Glass, joint managing director, and Col. J. W. Reeves.

The Bradford Branch of the **Electrical Contractors' Association** held its annual dinner-dance at the Midland Hotel, Bradford, on 10th March. The chairman, Mr. T. Pitts, proposing the toast of "The Towns and Trade of Bradford and Keighley," urged that employers and operatives in the electrical contracting industry should be registered. Mr. B. W. Berry, Deputy-Mayor of Bradford, responding, referred to Bradford's pioneering work in electricity supply and electric traction. The Mayor of Keighley, Mr. G. Samuel Mason, asked the Association to press for more electrification in the countryside. Other speakers were Mr. F. Matthews (president of the Bradford Chamber of Trade), Mr. A. S. R. Redvers Pratt (chairman of the Association's Northern Counties Sectional Board), Mr. F. Craven (a branch member) and the Mayoress of Keighley, Mrs. Mason.

The fourth annual dinner of the **Admiralty Electrical Engineers' Association** was held at Bath on 7th March. Mr. E. W. Tucker, the president, was in the chair and the guests included Mr. W. McClelland, former Director of Electrical Engineering, Mr. S. Mayne, general secretary of the Institution of Professional Civil Servants, Captain E. T. Wickham, R.N., Commander (L) H. H. Hughes, R.N., Mr. H. W. Chislett, secretary of the Royal Corps of Naval Constructors' Association, and Messrs. W. H. Frost, G. H. Fruin and L. H. Bugden. The principal speakers were Mr. S. Mayne, Mr. Tucker, Mr. H. D. MacLaren (Director of Electrical Engineering) and Mr. W. McClelland, the last-named reviewing the growth of the Electrical Engineering Department of the Admiralty from its inception at the beginning of the century. During the evening Mr. C. E. Helps, the retiring secretary of the Association, was presented with a canteen of cutlery by the president on behalf of the members.

OBITUARY

Mr. C. F. Trippe.—The death is announced of Mr. Charles Frederick Trippe, M.I.E.E., from 1927 to 1946 manager of the Sound Reproducer Sales Department of the British Thomson-Houston Co., Ltd. He died on 6th March at the age of seventy-four. Since his retirement from the B.T.H. Co. at the end of 1946 Mr. Trippe had been in indifferent health. He was born in Newfoundland and obtained his first engineering experience with the Thomson-Houston Co., U.S.A., at Lynn, Mass. (which afterwards became the American General Electric Co.), subsequently coming to this country where he was largely engaged in radio valve manufacture. He served in the Boar War and undertook pioneer work in connection with radio and signals in the 1914-1918 war, attaining the rank of captain, R.E. For many years Mr. Trippe was secretary of the Radio Dinner Club, membership being restricted to those engaged in radio in the 1914-1918 war.

Mr. F. H. Bevan.—The death occurred on 26th February at the age of forty-seven, of Mr. F. H. Bevan who served for over twenty years with the London Electric Wire Co. & Smiths, Ltd., and their associated companies. After two years as representative attached to the Manchester branch he became manager of the Leeds branch in 1930, which position he occupied up to the time of his death. Mr. Bevan was president of the Yorkshire (North West) Branch of the Association of Mining Electrical and Mechanical Engineers for 1940-41 and then became secretary.

The late Mr. F. H. Bevan

Mr. D. T. Evans.—The death occurred recently of Mr. D. T. Evans, district engineer in the Bridgend, Maesteg, etc., District of the South Wales Electricity Board.

Sir Frederick Stewart.—The death is reported of Sir Frederick (Charles) Stewart, which occurred on 10th March in Glasgow. Sir Frederick was chairman of Thermotank, Ltd., the North British Locomotive Co., Ltd., and Kelvin, Bottomley & Baird, Ltd., and was a director of S. Smith & Sons (England), Ltd.

WILLS

Professor A. S. Barnes, F.R.A.I., M.Sc. (Tech.), M.I.E.E., formerly professor of electrical engineering at Manchester University, who died on 5th November last, left £21,082 gross (£20,832 net).

Mr. T. J. Hudson, late district manager for W. T. Henley's Telegraph Works Co., Ltd., who died on 22nd November last, left £8,891 gross (£8,816 net).

Col. A. P. Pyne, M.I.E.E., R.A.(T.), retd., director of Ismay Cables, Ltd., who died on 10th October last, left £2,346 gross (£2,310 net).

Mr. S. D. Firth, chairman, F. C. Blackwell & Co., Ltd., who died on 4th June last, left £38,542 gross £37,762 net).

Mr. S. T. Quilliam, founder and managing director of Forest City Electrical Co., Ltd., Stretford, who died on 15th October last, left £86,098 gross (£85,374 net).

Commerce and Industry

Contractors' Conference

Equipment for Canadian Railways

FORMAL notification has now been sent to members of the Electrical Contractors' Association of this year's Annual Conference. This is to be held at Hastings from 24th to 26th May and the arrangements will be on very similar lines to those of previous Conferences.

The Conference paper (on 25th May) will be presented by Mr. S. L. M. Barlow, Associate I.E.E.; its title is "Trend in the Development of New Techniques in Electrical Installation."

The director of the E.C.A. calls upon members to make the Conference a bigger success than ever before as a means of increasing the Association's prestige. Ladies are particularly invited.

Home Laundry Centre

The importance of putting over to the public electric home laundry methods as a composite unit has not always been realized by either the manufacturer, the wholesaler or the retailer. The Hotpoint Electric Appliance Co., Ltd., has now established a demonstration centre for home laundry appliances, especially for the trade, at its showrooms, Crown House, Aldwych, London, W.C.2. The Centre is decorated in cream tones and is fitted with steel sink units with cream fronted cupboards, and with good work surfaces. The home laundry range consists of the new 1950 washing machine, model CF, the redesigned portable clothes dryer, table and rotary ironers, and the "Plus-Five" automatic hand iron. All the appliances have been wired for demonstration purposes.

Control of Engagement Ended

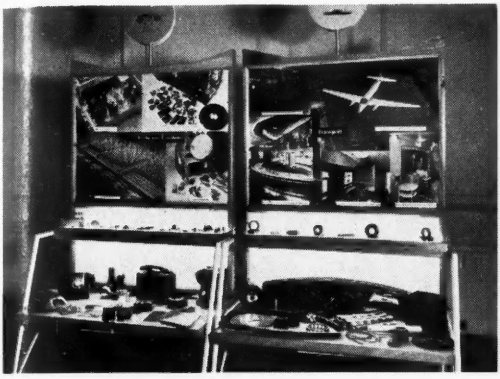
The Minister of Labour announced in the House of Commons on 9th March that the Government had decided to revoke, as from the end of the week, the Control of Engagement Order. Mr. Isaacs said that already there had been considerable relaxation of the Order, and since it came into force in October, 1947, only 29 people had been directed into employment, apart from 509 and 159 directions, respectively, in the cases of miners and agricultural workers.

Contractors' Sign Approved

The Minister of Town and Country Planning has now issued his decision in the case of a sign erected by B. and S. Electrical Contractors, Ltd., on their Guildford premises, which was the subject of a recent inquiry. The sign is one designed by the Electrical Contractors' Association, depicting a monkey fiddling with an electric fire which has not been switched off; it bears the injunction "It is not wise to monkey about with electricity." The sign overlooks the River Wey, but the locality is mainly of a commercial nature, and includes a garage, a car park and a railway station.

The Minister is of the opinion that the general characteristics of the locality are such that the display is not prejudicial to amenity. He accordingly allows the

The Hotpoint home laundry centre at Crown House, London



The radio, telephony and transport section of the travelling Bakelite exhibition which is now on show in London

appeal of the company against the order of removal made by the Town Council, subject to the condition that the sign shall be permitted for three years.

Engineering Workers' Ballot

It was decided at a meeting of representatives of trade unions affiliated to the Confederation of Shipbuilding and Engineering Unions, at York last week, to hold a ballot of members to decide whether to strike in order to enforce the claim for £1 a week increase or to submit the matter to arbitration. It is expected that the ballot will take some weeks; the result is to be reported to a meeting of the Confederation on 13th July.

Plastics Exhibition

Some of the many applications of plastics in industry are shown in a private exhibition of "Bakelite," "Warerite" and "Vybak" plastics which has been in progress during the past ten days at the exhibition rooms of the British Colour Council, 13, Portman Square, London, W.1. The principal feature is the Bakelite, Ltd., travelling exhibition which has recently returned from the Continent. This exhibition, which has visited Brussels, Oslo and Stockholm, was designed by Mr. R. Levin, M.S.I.A., in collaboration with the Publicity Department of Bakelite, Ltd. It is not only mobile and adaptable to sites of various sizes, but also compares favourably with the stands of other exhibitors at international trade fairs. When dismantled it can be packed for transportation into a special travelling lift case measuring only 12ft by 8ft by 8ft. The self-contained units which comprise the exhibition demonstrate the importance of plastics in every industrial sphere, and behind shelf displays there are photographic panels illustrating the essential properties of these plastics and some of their applications. Some of the stands are specifically concerned with electrical engineering, radio and telephony.

In opening the exhibition on 8th March Mr. H. V. Potter, chairman and managing director of Bakelite, Ltd., referred to the growth of the company, and mentioned that the following day would mark the fortieth anniversary of the Damard Lacquer Co., which was one of the three companies which eventually amalgamated to form Bakelite, Ltd. He spoke of the value of the travelling exhibition in fostering overseas trade, and stated that their exports (direct and indirect) totalled 65 per cent of their output. The exhibition closes on 30th March.

Industrial Standardization

Referring to the suggestion of the Lemon Committee that productivity could be improved by specialization, simplification and standardization so as to reduce the excessive variety of types of engineering items made and component parts needed for their manufacture, Mr. E. B. Moss, chief engineer, S. Smith & Sons (England), Ltd., states that the company established a Standardization Committee as early as 1945. This committee proceeded to draw up

Typical data sheet together with the attractive binder in which they are enclosed

standards of design for the wide range of motor car accessories and instruments manufactured by the company. They include not only dimensional standards and materials specifications, but also embrace components and principles of design. Data sheets covering these subjects are contained in serially numbered binders. Every draughtsman has one of these binders, which are amended and kept up to date through the technical library of the organization.

"Severance" Payments

In the House of Commons on Monday, Mr. Black asked the Minister of Fuel and Power when he anticipated being able to publish the regulations governing the payment to local authorities who, before nationalization, were electricity undertakers, of the amounts that they were to receive as compensation for loss on severance out of the sum of £5,000,000 provided for the purpose.

Mr. P. Noel-Baker said he hoped to publish the regulations very soon, but he was waiting for the views of some of the local authority associations upon the distribution of the amount.

Rolling Stock for Portugal

The first motor coach of an order for electric motor coach stock and a mixed traffic locomotive placed with the General Electric Co., Ltd., by the Sociedade Estoril, Portugal, was loaded on to a ship at Salford, near Manchester, on 1st March for shipment to Lisbon. This order was obtained in the face of intense competition from Continental manufacturers, and is stated to be the first order for electric rolling stock ever to be placed with a British firm by any of the Portuguese railways.

This equipment is for service on the 5ft 6in gauge railway running from the Cais de Sodre station in Lisbon to Cascais, along the northern shore of the Tagus estuary, serving *en route* the holiday resort of Estoril. This line is electrified at 1,500 V d.c. Electrical equipment, for the coaches and locomotive has been supplied by the G.E.C. The mechanical parts and bodies of the all-steel rolling stock, comprising two first- and second-class motor coaches, two second class and three third-class trailers, are being manufactured by Cravens Railway Carriage & Wagon Co., Ltd., Sheffield.

Because of its broad gauge and large overall dimensions, the motor coach could not travel to Manchester by rail. The body was mounted on special transport bogies for road haulage, and had to follow a circuitous route chosen to avoid sharp corners and bridges unsuitable for heavy loads.

E.L.F.A. Luncheon

The Electric Light Fittings Association is holding its annual luncheon at the Trocadero Restaurant, London, W.1, on 29th March. The guests will include Mr. J. N. Stephens, the first president (1926-27), and Mr. F. Winstanley (president, 1928-30).

Window-display Competition

There has been an excellent response to the first window-display competition organized by the South Western Electricity Board, eighty-seven displays from sixty-five different Service Centres having been entered. The main objects of the competition are to stimulate interest in the art of effective window display and to foster a healthy rivalry and interchange of ideas among Districts and Sub-Areas. An independent panel of experts is to judge the entries for the Area awards, in the week commencing 27th March. The composition of the panel has not yet been finally determined, but the following have consented to act as judges: Mr. A. J. Symes, F.R.S.A. (editor, *Display, Design and Presentation*), and Mr. H. G. Davis (display manager, Brights of Bristol). It is hoped to complete the panel by the inclusion of a lady member. The judging will in the first

Electric motor coach, made by the General Electric Co., Ltd., for the Sociedade Estoril being loaded for shipment to Lisbon

instance be on a Sub-Area basis, and small money prizes will be awarded to the three best displays in each Sub-Area. These winning teams will then compete for the Area challenge cup, merit certificates and other awards.

Cooker Demonstrations at Olympia

In response to an invitation from the Ministry of Food to the British Electrical Development Association, demonstrations by electrical housecraft advisers from the London Electricity Board have been arranged in the demonstration theatre, on the Ministry of Food stand at the *Daily Mail* Ideal Home Exhibition. The first two were held on 11th and 16th March. The remainder are on 21st, 24th and 29th March, between 9.30 a.m. and 9.30 p.m.

Locomotives for Australia

The English Electric Co., Ltd., has received an order for seventeen electric locomotives of 2,400 h.p. operating at 1,500 V d.c. and weighing 96 tons. They are to be used in connection with the suburban electrification in and around Melbourne. The locomotives will be capable of hauling goods trains of over 1,000 tons, and when used on passenger duties will be able to attain a speed of 75 m.p.h.. These locomotives will be made in the Preston Works of the company. The value of the contract is £A 1,300,000.

Equipment for Canadian Railways

A Ministry of Supply memorandum says that the Canadian railways are anxious to "Buy British," and the requirements of the Canadian National Railways alone, covering a wide range, were imported to the extent of $80 million last year. It is considered that British participation, small up to now, could be greatly increased if United Kingdom manufacturers can satisfy the technical requirements and standards which differ from those of British Railways.

A list of the classes of equipment purchased by the railways includes lightning arrestors, stokers for power plant, batteries, (track signal and car lighting), headlights, electric water coolers for cars, welding equipment, telegraph equipment, heat-treating furnaces, crack-detecting equipment, lighting sets, teletypes, voltmeters and ammeters, generator drives and glass insulators. Approach should be made by manufacturers to the railways' London representatives: Mr. F. Fawke, Purchasing Agent, Canadian Pacific Railways, 62, Trafalgar Square, W.C.2, and Mr. J. B. Thom, European Manager, Canadian National Railways, 15-19, Cockspur Street, W.C.2.

Increase for Ulster Workers

An increase of ¾d an hour is to be paid to workers in the electricity supply industry in Northern Ireland; it will be dated back to 16th February. In September last the men ceased work to enforce a claim for 1½d per hour and later 2d an hour was demanded. The award of the Joint Industrial Council for the industry provides that the increase shall be merged in the amounts above the schedule rates paid to some workers. It is stated that the increase brings the pay in the Northern Ireland supply industry more or less into line with the rates paid in Great Britain.

Port Talbot Strike Ended

Following upon the award of a Ministry of Labour arbitrator the electricians on strike at the Port Talbot works of the Steel Company of Wales returned to work last week. Mr. W. C. Stevens, general secretary of the Electrical Trades Union, said that the award was accepted but a protest regarding the procedure adopted by the arbitrator had been sent to the Ministry of Labour.

Trade Announcements

The head office and works of **Knight Electrical Industries, Ltd.,** have been removed to Lamp Works, London Road, East Grinstead, Sussex.

George Pearson (Engineers), Ltd., 208, Chingford Mount Road, London, E.4, have acquired from the liquidators the stocks, jigs, tools, drawings and manufacturing rights of Hotric, Ltd., and British Made Electric, Ltd.

J. M. Webber & Co., Ltd., have opened a branch at 266, Glossop Road, Sheffield, 10 (telephone: Sheffield 23552).

David Brown & Sons (Huddersfield), Ltd., have acquired the Precision Equipment (Pty.), Ltd., Benoni, Transvaal. This company is additional to that of David Brown & Sons, S.A. (Pty.), Ltd., in Johannesburg.

Catalogues and Lists

Thorn Electrical Industries, Ltd., 105-109, Judd Street, London, W.C.1.—Price list (AL/39) of fluorescent fittings and leaflet describing the FT/0080 translucent trough fitting.

Plessey Co., Ltd., Ilford, Essex.—Technical brochure describing the "Breeze" range of linear and rotary actuators for use in aircraft.

Gent & Co., Ltd., Faraday Works, Leicester.—Catalogue of liquid level control equipment.

Atomic Energy

Prospects of Industrial Application

ANY attempt to forecast the ways in which atomic energy would be applied for the good of mankind was as unreal as to prophesy the future of a five-year-old child.

It was with those words that Dr. M. L. Oliphant, professor of physics, University of Birmingham, commenced the Trueman Wood lecture which he delivered at the Royal Society of Arts in London.

The use of radioactive substances for research was widespread and growing ten years before they became available as by-products of atomic energy reactors. All such materials needed could be provided by other means and at a very small fraction of the cost, while the amounts required were so trivial in relation to what could be produced that their provision did not economically justify the development of atomic energy.

The application of the latter in warfare (with which the lecture was not concerned) was anything but economic and represented merely a diversion of effort from development of greater and more permanent human value. The successful application of atomic energy to power production would be almost unnoticed by most people, for most of the electricity generating equipment would remain, though the boilers and turbines might later be replaced by heat exchangers and gas turbines.

All-Electric Homes

It seemed to the lecturer that all industrial power should be distributed as electrical energy, except for some special purposes for which gas was essential, and that there was no excuse whatever for the use of solid fuel in the home. If atomic fuel proved to be cheaper than coal, which might well be the case ultimately, the price of electricity would be appreciably reduced.

The lecturer proceeded to explain how the nucleus was believed to be built up and to differentiate between fast and slow neutron reactors. The latter had some advantages over the former, but suffered from severe limitations not applicable to the other. The solution of the many difficulties involved, which were very real and must not be underestimated, was certain if the necessary effort were made; many of them were being attacked vigorously.

"Breeder" Reactors

The picture of the production of atomic energy for industrial uses which had been drawn so far was not encouraging, but the way out was clear. There were reasons why it might prove to be more practicable to design a successful "breeder" reactor of the fast rather than the slow neutron type. The most important of the questions to which answers had yet to be found was the extent to which the materials in the reactor would retain their physical properties (of strength, etc.) when the atoms of which they consisted were continually stirred up and knocked out of place by collisions with fast neutrons.

The U.S. Atomic Energy Commission had announced the construction of two types of experimental "breeder" reactor and a materials-testing reactor; the three together were estimated to cost 70 million dollars. The first was designed to test the practical feasibility of "breeding" with fast neutrons and to investigate the employment of liquid metals for the removal of fission-produced heat at high temperatures for the generation of power by conventional means. The second would produce significant amounts of electric power by the use of neutrons in the intermediate range of energies and, at the same time, determine whether "breeding" would be possible under those conditions. The Ministry of Supply, said the lecturer, had not yet announced plans for similar work in Britain.

It was not easy to estimate the economic cost of nuclear power. The energy

derived from 1 lb of uranium completely utilized in a "breeder" reactor was equivalent to that produced by burning 1,500 tons of coal, but the cost of uranium was about 1,000 times that of coal. The uranium must first be converted to a form suitable for use in a reactor, while the latter itself would cost more than a coal furnace, so it was not possible to do more than guess at the ultimate answer.

When atomic energy might compete with coal as a source of power would depend upon the relative efforts devoted to the military and industrial aspects of the subject. Meanwhile the possibility of using hydrogen as a nuclear fuel must not be ignored. The energy set free by condensing four atoms of hydrogen to form an atom of helium would be about five million times as great as that released by burning one atom of carbon. In other words, the transformation of 1 lb of hydrogen would produce about 100 million kWh and, weight for weight, hydrogen was ten times as good as uranium as a nuclear fuel.

There were possible ways in which an explosive reaction of this kind could be induced, but so far there was no clue to a method of controlling such a reaction. In any case, the lecturer concluded, the probability was small that any nuclear power would become available for useful purposes unless the problems of war were solved.

Gas-Turbine Research

Power Generation Possibilities

IN a lecture to the London Technical Group of the Electrical Power Engineers' Association last week, Mr. G. L. Duffett discussed the basic features and flow-circuits of constant-pressure gas turbines. For illustrating the functions of the components, the lecturer referred to the 500 h.p. unit built by C. A. Parsons & Co., Ltd. (after experiments initiated in 1937 but interrupted by the war) which was started up in December, 1945, and has now run for nearly 3,000 hours.

The essential components of a simple turbine he described as the compressor, the combustion chamber, the turbine and, for the open-cycle type, a pre-cooler to reduce the air temperature to its initial value for re-use after expansion in the turbine. At present about two-thirds of the turbine output was absorbed by the compressor so a one per cent change in compressor and turbine efficiencies meant approximately two and three per cent in overall efficiencies respectively. Raising the maximum temperature of the cycle from 1,100 to 1,200 deg F increased the efficiency of a simple turbine from about 18 to 20 per cent and also the specific output per lb of gas, which dictated the linear dimensions of the unit. Compression ratio varied widely with conditions, cost and size of components and required performance at partial loads. Thermodynamically the optimum ratio for a simple turbine operating at 1,200 deg F maximum was about seven for efficiency and five for specific output.

If the air from the compressor was preheated by the turbine exhaust in a heat exchanger of 75 per cent efficiency, that optimum pressure ratio would be reduced to 3.5 and the efficiency raised from 20 to 25 per cent. Compression in two stages with intermediate cooling lessened the work done and considerably increased the specific output, thus reducing the size of the component, which then, however, became dependent upon a water supply. Specific output could also be raised by reheating the gas to maximum cycle temperature between high-pressure and low-pressure turbines, but a heat exchanger was required to increase the efficiency materially.

A compound unit might consist of a high-pressure turbine driving a h.p. compressor and the alternator on one shaft with a low-pressure turbine driving a l.p. compressor on the other; it could have one stage each of intercooling and reheat, with heat exchange and turbine-inlet temperatures of 1,200 deg F. It would have an efficiency of over 29 per cent nearly constant down to half load, the l.p. com-

pressor being free to slow down at reduced loads.

A second arrangement differed only in having the alternator on the l.p. line, which then ran at constant speed. The full-load efficiency would fall at lower loads owing to drop in temperature. This scheme was more suitable for peak-load operation and without heat exchanger gave a better distribution of intercooling and reheat and yielded an efficiency of over 23 per cent, which was higher than in the first arrangement.

The axial-flow compressor, in spite of its limited working range and tendency to surge, was most generally satisfactory. Although like a reversed turbine, the aerodynamic design differed and the blading was fundamentally more difficult to design. An air filter was necessary when this type of compressor was associated with an open-cycle turbine.

Turbines were of the axial-flow type of impulse or reaction design. The latter was the more efficient and would operate over a wider range of velocity ratios, though an impulse stage at the beginning would reduce the temperature of the first row of moving blades and of the rotor. The latter rather than the blades limited the temperatures to values that avoided creep in long-life machines. A gas turbine must be motored up to 25 per cent speed before it became self-operated. The starting power was two to five per cent of full output. Open-cycle turbines at present required distillate fuel oils to avoid rapid fouling of the blades.

Summing up, Mr. Duffett said that the gas turbine was already established as an aircraft prime mover. It was attractive for marine work provided its reliability could be proved, but its economic use on railways in this country would depend upon its ability to run on coal, since oil cost 2 to 2.5 times as much per B.Th.U. For power generation, with outputs up to 20 MW, the open-cycle systems would be immediately suitable for peak-load and stand-by duties at load centres with an efficiency of from 22 to 30 per cent. For continuous base-load generation, however, only a closed-cycle turbine (up to 100 MW using coal) seemed an economic possibility now, with an efficiency of 32 to 39 per cent, but this system had disadvantages, including bulkiness.

The use of open-cycle turbines of from 1 to 5 MW without reheat or intercooling and having efficiencies of from 18 to 26 per cent should find good opportunities where distillate oil or natural or blast-furnace gas were available. Waste heat from the exhaust of gas turbines could be used for district heating without appreciably affecting their performance, provided there was a suitable balance between the power and heat requirements.

Pulse-Monitored Servo Systems

IN a paper which was read before the Measurements Section of the I.E.E. in London this week, Dr. A. Porter and Major F. W. Stoneman, both of whom were formerly at the Military College of Science, Shrivenham, presented a new approach to the design of pulse-monitored servo systems. If, as is the case with these systems, the input information fed into the system is only available at discrete intervals, the standard methods of design may be inadequate, particularly if the interval periods are comparatively large. The present paper introduces a method of handling the problem by using cascaded integrators to generate polynomials.

Assuming ideal integrators, it is shown that the optimum values of the control parameters of the system satisfy a general law. Furthermore, it is demonstrated that for a given interval period and number of integrators the theoretical errors at each interval point can be calculated for any continuous analytical or tabulated input function. Brief consideration is also given to the problem of unequal interval periods.

Tests on a "Meccano" model and large-scale analyser have confirmed the theory and indicated that the effect of inaccuracies in instruments is appreciably reduced by the correction system. The arrangement is also shown to be a very effective rate-measuring device. This property may also be of value in certain process control systems.

The problems involved in designing a pulse-monitored servo system are also discussed and a brief description is given of an electrical 2-integrator pilot model which has been constructed. It is emphasized that the development of such systems is, as yet, in its early stages, and in view of this the authors outline some of the problems which will have to be tackled.

ELECTRICITY SUPPLY

New Battersea Hydrogen-Cooled Set

Hull Cooling Tower Modifications

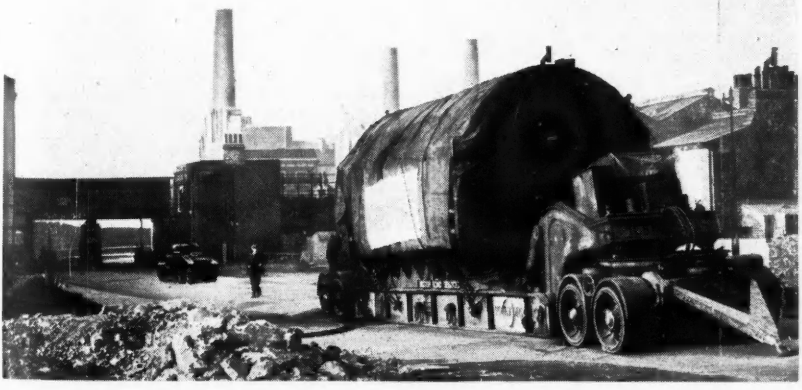
A MONTH ago it was announced by the Metropolitan-Vickers Electrical Co., Ltd., that the first hydrogen-cooled steam turbo-alternator made for installation in the Battersea power station (superintendent: Mr. H. J. Taylor) in Group II of the London Division, B.E.A., had been completed and was ready for dispatch. It is the third generating set of its type and size to be manufactured at Trafford Park, being rated at 66,667 kVA at 3,000 r.p.m. The accompanying illustration shows the stator of this machine nearing the end of its journey by road from Manchester to London. To enable the tractor-drawn trailer with its load to pass under the railway bridge which crosses Stewarts Road, Battersea, 14ft above the highway, some 9in of the road surface had to be taken up and piping removed from the under-side of the bridge to provide 3in clearance.

Castle Donington Scheme

Mr. W. S. Burge, controller, B.E.A. East Midlands Division, stated last week that the new generating station which it was proposed to build in the Castle Donington area would be a model in engineering and architectural practice. After having seen the best examples in design in various countries they had now in mind what the layout would be. Everything would be done to eliminate grit, smoke and steam. They firmly believed that it was possible to build a generating station which would be a thing of beauty and not detract from the amenities of the district. A start was already being made on the preliminary lay-out but it might be two years before the physical side of the work could be begun.

Speeding-up Power Station Plans

The North Regional Board for Industry, in a statement on 10th March, said that more urgent action was needed to quicken the power station expansion scheme. The Board had agreed that the Regional Board Division of the Treasury should be asked to make representations to the Government, to find out if a speed-up could be effected by modifying the high standard of specification for power station schemes, even if only temporarily. It also suggested that every effort be made to bring into commission all auxiliary generating equipment, if only for peak



Stator of the 66,667 kVA hydrogen-cooled generator for Battersea station near its journey's end

periods, and that consideration be given to a drastic limitation of electrical equipment installed in new houses.

Cooling Tower Experiments

In connection with experiments which have been carried out at Sculcoates power station, the divisional controller of the B.E.A. Yorkshire Division (Mr. G. A. Vowles) has informed Hull Corporation that the Authority has now approved his proposals for modifications to the concrete cooling tower. These modifications are in the nature of an experiment necessitating the fitting of a "droplet eliminator," consisting of a timber lath stack covering the whole internal diameter of the tower at the throat and approximately 11ft above the distribution nozzles. Tests with a model tower have indicated an efficiency of droplet removal of the order of 90-95 per cent. The cost of installing such an eliminator at Hull will be approximately £12,000, and instructions have been given to the Davenport Engineering Co., Ltd., to put the manufacture in hand immediately in the hope that the equipment will be ready for installation in the early spring. The manufacture of the laths and general preparation of timber have already commenced, and it is confidently hoped that when this eliminator is put into service the operation of the tower will show a very marked improvement.

Scottish Claim on B.E.A.

The South East Scotland Electricity Consultative Council has decided to suggest to the British Electricity Authority that full credit should be given to the S.E. Scotland Electricity Board, as from vesting date, in respect of all investments and cash vested in the B.E.A. from local authority general reserves. About a year ago the Council made a similar recommendation to the Board. The amount involved is £1,042,000, £1,020,000 from Edinburgh and the rest from other local authorities.

Mr. J. M. Airlie, the chairman, said that it seemed inequitable that while the Central Authority held the surpluses the Area Board was responsible for debt.

The proposal adopted follows a decision taken on 27th February by the S.E. Scotland Board that if the Central Authority did not allow it full credit for all local authority general reserves existing in S.E. Scotland at the vesting date it would ask the Minister of Fuel to deal with the matter.

"Grit" Plant for Southampton

Mr. Noel-Baker, Minister of Fuel and Power told Dr. King on Monday that tenders had been received by the British Electricity Authority for the supply and installation of grit-arresting plant at the Southampton generating station and that a contract would be let within the next two or three weeks. Owing to the time needed for the manufacture of the equipment and the necessity to confine the installation work to the summer months, there was little likelihood of the work being completed before September, 1951.

Generation in February

In February 4,724 million kWh was generated at stations controlled by the British Electricity Authority, the North of Scotland Hydro-Electric Board and the Lochaber Power Co. This was 11.4 per cent more than in the corresponding month of last year, the rate of increase being at about the same level as in January (11 per cent). No additional generating plant was put into commission during the month—there was, in fact, a net decrease of 4 MW in total capacity—but new boilers were installed at Ferrybridge (Mitchell 180,000lb/hr), Kearsley (Babcock & Wilcox 173,000 lb/hr), Walsall (Babcock & Wilcox 150,000lb/hr) and Kingston-upon-Thames (Stirling 260,000lb/hr).

	Fuel Consumed Thousand Tons		kWh generated Millions			kWh sent out Millions	Installed capacity (m.c.r.) MW
	Coal	Oil	Steam	Water Power	Total*		
British Electricity Authority ...	2,721	4.8	4,566	46	4,626	4,369	13,583
North of Scotland	23	1.2	33	60	98	97	327
Total for February, 1950	2,744	6.0	4,599	106	4,724	4,466	13,910
Total for February, 1949	2,483	4.4	4,111	115	4,242	4,007	13,250
Increase or decrease, per cent ...	+10.5	+36.4	+11.9	−7.8	+11.4	+11.5	+5.0
Total for Jan.-Feb., 1950	5,784	12.7	9,717	243	10,000	9,453	—
Corresponding total for 1949 ...	5,302	9.4	8,709	254	8,999	8,501	—
Increase or decrease, per cent ...	+9.1	+35.1	+11.6	−4.3	+11.1	+11.2	—

*The total figure includes generation by oil engines, refuse destructors and waste heat plants amounting to 10 million, 0.2 million and 8.3 million kWh respectively in February, 1950.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

REPORTS AND DIVIDENDS

Hoover, Ltd.—The annual meeting will be held on 3rd April. In his statement issued with the report and accounts, Mr. C Colston (chairman) says that their total sales of electric cleaners have increased above the previous year's record, and there has been a substantial rise in the home market. The sales of Hoover washing machines are rapidly rising and their export shipments have made a marked contribution to this expansion. They have established a factory at Cambuslang for the manufacture of fractional h.p. motors, and the production of these motors for their washing machines had been transferred from Merthyr Tydfil to Cambuslang. During 1949 they still further increased their exports, about 43 per cent of which went to hard currency markets. Mr. Colston reviews the results of the Hoover subsidiaries abroad, and refers among other matters to the need for incentives to companies to expand their exports, and for incentives to executives and to workpeople.

Franco Signs, Ltd., report a net revenue for the year to 30th September last of £4,630, as compared with £13 for the previous period. It is proposed to pay an ordinary dividend for the year of 3 per cent, less tax. No payment was made for the previous period of six months when the accounting date was changed to coincide with that of operating subsidiaries. The consolidated trading profits, less losses for the year was £43,197 (against £25,314).

Switchgear & Cowans, Ltd., report a net profit for the year ended 31st December last of £60,143, as compared with £58,629 in the preceding year, and after providing £34,337 for taxation, it is proposed to pay a dividend of 20 per cent for the year (unchanged), contribute £1,000 to the pension fund and to carry forward £41,251 (against £32,945 brought in).

Ericsson Telephones, Ltd., reports a trading profit for 1949 of £1,051,071, as compared with £706,808 for 1948, and a net profit of £486,918 (against £368,436). General reserve receives £400,000, special reserve for reconstruction of works canteen £30,000, and it is proposed to maintain the ordinary dividend for the year at 17 per cent, plus a bonus of 3 per cent, tax free. The balance carried forward is £175,992 (against £201,780 brought in). The report states that a new output record was set up during the year, the major portion again being for export. For some time past there has been a recession in the demand from overseas and competition has become much keener. The order book, however, is substantial and the directors are confident that there will be little decrease in production during the current year.

Rheostatic Co., Ltd., reports a net profit for the year ended 30th September last of £25,609, as compared with £38,631 for the preceding year. It is proposed to pay a final ordinary dividend of 10 per cent on capital increased by a 50 per cent bonus issue. With the interim of 6 per cent paid on the old capital, the total for the year is 16 per cent (against 20 per cent).

The Barbados Electric Supply Corporation, Ltd., reports a trading profit, with investment income, of £37,112 for the year ended 30th June last, as compared with £34,649 for the preceding year, and a net balance of £21,650 (against £23,204). The dividend for the year is unchanged at 5 per cent, tax free, and £2,812 is carried forward (against £1,662 brought in).

The Greengate & Ilwell Rubber Co., Ltd., reports consolidated trading profit for the year ended 24th December last of £559,009, as compared with £634,810 for the preceding year. The parent company's net profit is £188,600 (against £218,858), to which is added £193,493 brought in. The final ordinary dividend is 1s 3d per share, making 2s 6d for the year (same), and the deferred dividend is 3d per share (unchanged). General reserve receives £140,000, and the balance carried forward to next account is £198,655.

The Jamaica Public Service Co. is making an issue on 20th March of 50,000 5 per cent £1 class "D" preference shares at 20s per share, payable in Jamaican sterling on 1st April. The purpose is to finance the company's development programme, including the construction of a new hydro-electric plant in the lower White River, work on which has already begun.

The Direct Spanish Telegraph Co., Ltd., is again paying a dividend for the year of 4½ per cent.

Thos. W. Ward, Ltd., are again paying an interim dividend of 5 per cent.

NEW COMPANIES

Brush Export, Ltd.—Registered 8th March. Capital £100,000. Electricians, mechanical engineers and manufacturers, producers, sellers, importers and exporters of all kinds of electrical apparatus and appliances, etc. Directors: Alan P. Good, Hon. A. C. Geddes, (directors, Associated British Engineering, Ltd., and other companies), A. H. Syme (director Hopkinson Electric Co., Ltd.), J. W. C. Milligan and R. Bate. Regd. office: Falcon Works, Loughborough, Leics.

J. C. (Wholesale) Electric Supplies, Ltd.—Private company. Registered 3rd March. Capital £1,000. Wholesale agents, factors and dealers in wireless and television sets, apparatus and components, etc. Directors: R. B. E. Woodhouse and J. H. Eden. Regd. office: Plantation House, 31/4, Fenchurch St., E.C.3.

Unicorn Electric Co., Ltd.—Registered 4th March. Capital £100. Manufacturers of and dealers in wireless and television apparatus, electronic equipment, etc. Subscribers: L. J. Mison and T. A. R. Pizzie. Solicitors: Evans Baker & Co., 8, Queen Anne Street, W.1.

Wentworth Electrical Services, Ltd.—Registered 4th March. Capital £300. Wholesale and retail dealers in and manufacturers of radio and television sets and equipment, electrical apparatus, etc. Directors: H. V. Smith, T. J. Williams and Capt. F. J. A. Coleby. Solicitors: Titmuss Sainer & Webb, 61, Carey Street, W.C.2.

Heath Radio Electric, Ltd.—Registered 2nd March. Capital £2,000. To acquire the business of radio, television and electrical engineers and retailers carried on by L. J. W. Gilbert and E. V. C. Gilbert at 115, Shooters Hill Rd., Blackheath, S.E.3. Directors: L. J. W. Gilbert and E. V. C. Gilbert. Regd. Office: 115, Shooters Hill Rd., Blackheath, S.E.3.

Gilbert & Stamper, Ltd.—Registered 8th March. Capital £8,000. To acquire the business of an electrical, wireless and refrigeration engineer now carried on by R. A. R. Stamper at 34, Quarry Hill Road, Tonbridge, Kent, as Gilbert & Stamper. Directors: R. A. R. Stamper and J. B. Johnstone. Regd. office: 34, Quarry Hill Road, Tonbridge, Kent.

W. H. Packer, Ltd.—Registered 23rd February. Capital £3,000. Wholesale and retail electrical and radio dealers, etc. Directors: W. H. Packer, A. A. Fenton and W. W. Hedgecoe. Reg. office: 54, Crouch End, Broadway, Hornsey, N.8.

Sebley Laminations, Ltd.—Registered 25th February. Capital £4,000. Manufacturers of electrical laminations and press tools; engineers, etc. Directors: M. R. Sebbage and E. G. Whitley. Regd. office: 30, Fleet Street, E.C.4.

WINDING-UP ORDER

Ward Electrical Engineering Co., Ltd.—In the Companies Winding-up Court on 13th March, Justice Wynne Parry made an order for the compulsory winding up of Ward Electrical Engineering Co., Ltd., on a judgment creditors' petition for £478. There was no opposition.

INCREASE OF CAPITAL

London Electrical Co. (Blackfriars), Ltd.—Increased by £50,000 in £1 shares beyond the registered capital of £47,500.

LIQUIDATIONS

Radio & Electrical Supplies (Staffs), Ltd.—Creditors' voluntary winding-up. Meetings of members and creditors on 14th April at 17, Albion Street, Hanley, Stoke-on-Trent, to receive an account of the winding-up by the liquidator, Mr. R. E. Clark.

BANKRUPTCIES

H. F. Mouncey, 4, Cromer Road, Tooting, London, S.W.17, electrical engineer.—Receiving order made 6th March on a creditor's petition.

J. G. Sandell, 20, Hart Road, and Ansell Road, Dorking, Surrey, electrical contractor.—Last day for receiving proofs for dividend 24th March. Trustee, Mr. C. T. Newman, 3, Central Buildings, Westminster, London, S.W.1.

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within a month of 8th March.

MYTEMIN (design). No. 682,851. Class 7. Electrically operated chain pulley blocks.—Geo. W. King, Ltd., Hartford Works, Walsworth Road, Hitchin, Herts.

VACHROME. No. 682,368. Class 9. Electrical resistance wire made of chrome metal.—Vactite Wire Co., Ltd., 24, Queen Anne's Gate, Westminster, London, S.W.1.

CIPEL. No. 682,790. Class 9. Electric storage batteries and electric accumulators, and parts of and fittings for all such goods, all included in Class 9.—Compagnie Industrielle des Piles Electriques (C.I.P.E.L.), Neuilly-sur-Seine, France. Address for service, c/o D. Young & Co., 29, Southampton Buildings, Chancery Lane, London, W.C.2.

CRATER. No. 684,271. Class 9. Electrical apparatus and instruments included in Class 9.—Crater Products, Ltd., The Lye, St. John's, Woking, Surrey.

WINDOLUX. No. B682,088. Class 11. Lighting fittings for use in shop window lighting.—Scemco, Ltd., 6-7, Soho Street, London, W.1.

FINANCIAL SECTION

STOCKS and SHARES

THE next major item in the political financial programme is the Budget, and various speculations are in circulation as to the manner in which the Chancellor of the Exchequer will raise the colossal sums now required. Prices of British Government funds are generally assumed to give some indication in advance of what the Chancellor's intentions may be. The guessers on this present occasion have little to go upon, other than the present necessity for raising a vast amount of revenue. Gilt-edged stocks are quiet. Industrial shares maintain their ground with a fair amount of strength.

Company News

Switchgear & Cowans' 20 per cent dividend, declared last week, will be paid on capital increased to £150,000 by the issue a year ago of 120,000 5s shares at 14s. It takes £16,500 this time, from available profits of £26,000, which are some £8,000 up on last year's results. The 5s shares stand at 15s. The profits statement of Franco Signs reflects—appropriately—the brighter lighting regulations, and brings the 10s shares back to the dividend list with a 3 per cent payment. They are quoted at 8s 3d.

The Hoover annual report contains an illuminating and exhaustive statement from the chairman, Mr. Charles Colston, who has no difficulty in justifying the board's decision to raise the dividend from 40 to 45 per cent. The price of the 5s shares at 38s 3d retains its previous rise. At this level, and on a 45 per cent dividend, the return is a satisfactory £5 17s per cent.

The Telephone Group

The Ericsson results are calculated to attract new interest in the coming reports of others in the field. Automatic Telephone & Electric and Siemens both ended their financial years with the calendar, and produced their final dividends for 1948, with preliminary figures, in the middle of May. The former paid 12½ per cent, from earnings of 63 per cent, and the shares are quoted currently at 53s to yield £4 14s 6d per cent. Siemens ordinary, at 31s, pay £4 16s 9d, on the 7½ per cent distributed from earnings of 18¼ per cent in 1948. Telephone Manufacturing's dividend of 9 per cent (covered four times by earnings) was declared last June; the 5s shares at 8s 6d yield 5¼ per cent.

Ericsson Profits

Another remarkable advance is recorded in the profits statement accompanying Ericsson Telephones' final dividend declaration, which again brings the total up to 20 per cent, free of tax. Having tripled the net profit in 1948, the company now reports provisionally a rise of £118,000, to £487,000, in the net figures for 1949. Since the previous earnings were equal to practically 100 per cent on the ordinary capital, the 20 per cent payment (of which 3 per cent is still described as bonus) can take a place now among the most cautious distributions in the industrial market. It is below the pre-war rate. After a moderate rise to 40s 9d, the 5s ordinary shares yield £2 9s 2d per cent net, equivalent to a return of £4 12s 6d per cent subject to income tax.

Parmiter Hope & Sugden

Parmiter, Hope & Sugden, Ltd., make up their year to the end of March, and the 1s ordinary shares are the subject of attention round about 2s 9d. Last November, the directors decided that it was desirable to capitalize £53,710 of the revenue reserves, and application for Treasury consent was on the point of being despatched when the Chancellor of the Exchequer announced that "consents are not at present being granted." Consent, however, is not needed where the amount in question is less than £50,000. Accordingly the amount was altered to £48,339. The new shares rank in all respects *pari passu* with the old. The present issued capital is £132,500, of which £102,049 is in ordinary shares of 1s each. The company has paid dividends of 30 per cent per annum for the three years ended 1949; in the latter year, a jubilee bonus of 20 per cent was added.

The Week's Changes

Cable & Wireless stock holds its price with noticeable firmness and at 277½ is 3½ points higher on the week. British Electric Traction deferred stock at 470 is 25 points lower. In the industrial list, Reyrolle are a good spot with a rise of 2s 6d at 60s. C. A. Parsons at the same price show a similar improvement. Both shares generally move more or less in correspondence. Great Northern Telegraphs, after their recent rise, reacted 30s to 15¼. A fall of 3s 9d lowered Aron Electrics to 27s 6d. E.M.I. at 19s 6d are 1s 6d down. Electric Constructions 1/6, at 44s. 6d. Automatic Telephones are better at 53s. Chloride hardened to 45s.

Technical Education

Conference on Advanced Studies in Electrical Engineering

THE lecture theatre of the I.E.E. was packed to capacity on Monday last, 13th March, when representatives of the universities, technical colleges and industrial concerns attended a conference for the purpose of discussing the need for, and the provision of, advanced electrical engineering courses.

After Professor E. B. Moullin, the President, had made a few introductory remarks, Sir Percy Dunsheath spoke on the needs of industry, saying that new knowledge was produced so rapidly that it was practically impossible for one person to keep abreast with more than a limited part of his own field. While the journals of the learned societies formed an efficient clearing house, their use had serious limitations. Some efficient means of selection and dissemination was vital as was the interpretation of results in a manner understandable to non-specialists; this should lead to shortening the gap between a discovery and its application. He felt there was great scope for advanced courses covering well defined sections of electrical engineering, in which an expert presented recently published knowledge in a palatable form.

University Contribution

In introducing the university aspect and contribution, Professor Willis Jackson said that the ability of students to absorb new ideas and information did not grow at a corresponding rate with the increase in these ideas, which demanded attention outside the accepted undergraduate and National Certificate courses.

The course to remedy this state of affairs was essentially a function of technical colleges. We had much to learn from the Massachusetts Institute of Technology but also much to guard against. Courses should be closely interrelated to research and there should be co-ordination between research and postgraduate study. The major university contribution, he felt, which the larger technical colleges might wish to support, should be directed on a full-time seasonal basis towards those men desirous of undertaking research and long-term development work and who after a period in industry wished to strengthen their scientific and analytical knowledge.

Referring to the technical college aspect, Dr. J. E. Richardson said there were two types of student, the university graduate who might be assumed to have adequate knowledge of mathematics and the Higher National Certificate man who might need further studies in both mathematics and pure science. He had arranged a number of these and had found that the most popular were part-time evening courses. Although these courses were desirable, the technical colleges were too over-crowded and generally inadequately staffed to meet such demands.

Specimens of the syllabuses for telecommunication courses were then put forward and explained by Dr. W. G. Radley, after which Dr. S. Whitehead dealt with measurement courses in a similar fashion and Mr. R. H. Coates spoke on heavy electrical engineering courses.

Points from Discussion

From the ensuing discussion it seemed clear that, in general, everyone agreed that the courses would be a good thing, although perhaps there was too much thought in terms of formal lecture courses and not enough emphasis on the social aspect, which was considered important. The vital thing some speakers considered, was the creation of an attitude of mind or broadening of outlook as well as an improvement in technique. There were widely divergent views with regard to mathematics, some speakers thinking that it should be minimized to assist those students whose mathematical ability had deteriorated during a period in industry, while others felt it was essential as it contributed toward logical and clear thought. It was suggested that material could be transferred from National Certificate courses to postgraduate lectures to reinforce fundamentals.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1944

3081. Stevens, A. H. (Submarine Signal Co.).—Operation of direct current motors over desired speed ranges. 18th February, 1944. (636732.)

10655. Stevens, A. H. (Submarine Signal Co.).—D.c. electric motor control circuits. 24th May, 1944. (636691.)

1945

19736. British Thomson-Houston Co., Ltd.—Dies for coating ribbon wire. 1st August, 1945. (636453.)

32771. Raleigh Cycle Co., Ltd., and Brown, W.—Tyre-driven dynamos for bicycles. 3rd December, 1946. (636526.)

1946

3243. Stone & Co., Ltd., J., and Chapman, E. E.—Regulation of alternators. 28th August, 1947. (636454.)

5152. Standard Telephones & Cables, Ltd., McWhirter, E. M. S., Dunn, R. H., and Lennox, P. W.—Electric signalling systems. 14th February, 1947. (636667.)

5153. Standard Telephones & Cables, Ltd., McWhirter, E. M. S., Dunn, R. H., and Lennox, P. W.—Telegraph receivers. 14th February, 1947. (636668.)

10306. Loria, W. J., and Suhre, J.—Electronic sphygmamanometer oscillator. 3rd April, 1946. (636458.)

10898. Fredholm, J. O. H., and Claesson, P. H. E.—Varying the resonance frequency of cavity resonators. 9th April, 1946. (636527.)

11520. Standard Telephones & Cables, Ltd., Wright, E. P. G., Gould, W. F., Hargreaves, T. F. S., and Reynolds, W. J.—Signalling in telephone systems. 15th April, 1947. (636669.)

25866. Sperry Gyroscope Co., Inc.—Position data signal transmission systems. 28th August, 1946. (636671.)

25963. France, H. G. de.—Apparatus relating to television transmission or reception. 29th August, 1946. (636534.)

31674. Birmingham Small Arms Co., Ltd., and Goldschmidt, R.—Alternating-current generators. 23rd August, 1947. (636465.)

32393. Philips Lamps, Ltd.—Transmitters and receivers for single-sideband signals. 31st October, 1946. (636467.)

35497. Sperry Gyroscope Co., Inc.—Control valves. 29th November, 1946. (636679.)

36193. British Thomson-Houston Co., Ltd.—Preparation of sintered metal articles for electroplating operations. 6th December, 1946. (636736.)

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763. Lawson, J. D.—Means for translating, oscillating or rotating a beam of electromagnetic radiation. 9th February, 1948. (636541.)

990. Mondial Radio Soc. A. R. L.—Telephonic amplifier obtained by utilizing a radio-receiver apparatus. 11th January, 1947. (636474.)

2296. Aktiebolaget Hakanssons Industrier.—Voltage pulse sources for electric fences. 24th January, 1947. (636599.)

3983. Soc. Anon pour les Applications de l'Electricité et des Gaz Rares, Etablissements Claude-Paz & Silva.—Process for sealing electric lamps and the like. 11th February, 1947. (636740.)

10105. Philips Lamps, Ltd.—Electric-discharge tubes comprising a source of electrons and a luminescent screen. 16th April, 1947. (636483.)

12605. Communications Patents, Ltd., Jackson, R. D. C., and Zade, H. P.—Seam-welding of thermoplastic material in sheet or strip form. 9th June, 1948. (636747.)

14051. Hobart Manufacturing Co.—Dish-washing or like machines. 27th May, 1947. (636749.)

14078. M-O Valve Co., Ltd., and Wyke, R. E. B.—Electric-discharge devices. 24th May, 1948. (636488.)

15533 British Thomson-Houston Co., Ltd.—Electromagnets. 12th June, 1947. (636689.)

15642. Western Electric Co., Inc.—High-frequency signalling systems. 13th June, 1947. (636611.)

15894. Warner, E. F.—Battery terminal cleaner tool. 14th June, 1948. (636489.)

16975. Perivale Clock Manufacturing Co., Ltd., and Brown, T. A.—Synchronous electric striking clocks. 28th June, 1948. (636753.)

17580. M-O Valve Co., Ltd., and Tremlett, C. A.—Thermionic valves. 5th July, 1948. (636614.)

17583. General Electric Co., Ltd., and Tremlett, C. A.—Heat-exchangers for exchanging heat between a solid surface and a fluid. 5th July, 1948. (636615.)

17832. Roussel, C.—Electric mains made up of premade elements. 7th July, 1947. (636490.)

18646. Armstrong Cork Co.—Dielectric heating. 14th July, 1947. (636492.)

20279. Westinghouse Electric International Co.—Anode units for X-ray tubes. 28th July, 1947. (636762.)

20696. Airmec Laboratories, Ltd., Simmonds, J. C., and Jones, J.—Apparatus for measuring frequency of electric oscillations. 30th July, 1948. (Addition to 589562.) (636693.)

20788. General Motors Corporation.—Electrical system for synchronizing the speeds of prime movers. 31st July, 1947. (636495.)

20790. General Motors Corporation.—Refrigeration apparatus. 31st July, 1947. (636618.)

21746. Bendix Aviation Corporation.—Combination step-by-step and induction motor. 7th August, 1947. (636619.)

21762. Western Electric Co., Inc.—Attenuation equalizers. 7th August, 1947. (636620.)

21838. Electric Construction Co., Ltd., and Milne, J. C.—Electrical supply systems. 1st June, 1948. (636621.)

22622. Hoover, Ltd.—Suction cleaners. 14th August, 1947. (636625.)

23230. British Thomson-Houston Co., Ltd.—Kitchen cabinets. 21st August, 1947. (636627.)

23485. Sangamo Weston, Ltd.—Exposure meters. 25th August, 1947. (636562.)

24096. Standard Telephones & Cables, Ltd., McWhirter, E. M. S., Dunn, R. H., and Lennox, P. W.—Circuit arrangements for selectively causing a desired potential to appear at a desired point in the circuit. 13th November, 1947. (Divided out of 636667.) (636700.)

25613. Sangamo Weston, Ltd.—Electrical measuring instruments. 19th Septmber, 1947. (636629.)

26021. Muirhead & Co., Ltd., Tucker, E. W., and Bell, J.—Electrically maintained tuning forks. 17th September, 1948. (636563.)

26149. Westinghouse Electric International Co.—Electrostatic precipitators. 26th September, 1947. (636632.)

26850. British Broadcasting Corporation, and Money, M. B.—Apparatus for testing radio-frequency amplifiers and the like. 10th November, 1948. (636770.)

27010. Runbaken, J. H.—Heaters for preventing freezing of the cooling water of internal-combustion engines. 21st November, 1947. (636634.)

28635. Lightfoot Refrigeration Co., Ltd., and Sinclair, W. R.—Refrigerating systems. 29th July, 1948. (636636.)

29502. Banwell, C. J.—Telecommunication and radar systems. 4th November, 1948. (636638.)
29749. Lancaster, S. D.—Electric motors with speed-reduction gearing. 7th November, 1947. (636640.)
29984. Kolster-Brandes, Ltd., and Montgomery, W. A.—Power units for radio receivers or the like. 5th November, 1948. (636507.)

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192. General Electric Co., Ltd., and Ward, L. G.—Arrangements for supporting rotatable shafts, axles and the like. 3rd January, 1949. (636512.)
367. Winther, M. P.—Pole structures for dynamo-electric machines, for use as eddy current slip couplings, brakes, dynamometers and the like. 6th January, 1948. (636565.)
1272. English Electric Co., Ltd., and Wilson, F.—Pantograph current collector. 14th January, 1949. (636570.)
1280. General Electric Co., Ltd., and Wardle, A.—Friction clutches. 12th October, 1948. (636706.)
2152. Fisher, A. W., and Kacser, F.—Construction of small electric motors. 23rd January, 1948. (636572.)
3424. British Thomson-Houston Co., Ltd.—Electro-magnetic recording heads. 5th February, 1948. (636578.)
3648. Wiegand Co., E. L.—Electrical heating apparatus. 7th February, 1948. (636658.)
5795. English Electric Co., Ltd., Gross, W. L., and Hughes, J. O. P.—Gearing of accessories for gas turbines. 24th February, 1949. (636581.)
6032. Wego Condenser Co., Ltd., and Stephan, F. C.—Electric connector arrangements for capacitors. 26th February, 1949. (636583.)
6666. Senior, A. J.—Electrically heated soldering irons. 3rd March, 1948. (Cognate applications 6667, 24th May, 1944, and 6668, 17th November, 1944.) (636714.)
8446. British Insulated Callender's Cables, Ltd., and Hibbitt, A. E. W.—Means for detecting leaks in the enclosures of electric cables containing gas under pressure. 21st March, 1949. (636514.)
9058. Brooke, W., and Baldwin, H. T.—Earth leakage protective systems for electric motors, cables and other apparatus. 31st March, 1948. (Addition to 605927.) (636720.)
9792. Bendix Aviation Corporation.—Superheterodyne frequency converters. 7th April, 1948. (636744.)
10023. Maschinenfabrik Oerlikon.—Multi-stage radial turbine for gas turbine plants, 9th April, 1948. (636755.)
10855. Compagnie Industrielle des Téléphones.—Amplifying voltmeter with a logarithmic scale. 20th April, 1948. (636727.)
11982. Stanton, H. B.—Snap-action electric switches. 21st May, 1949. (636786.)
12025. Santon, Ltd., Haworth, R., and Smith, W. G.—Clamping means for securing electric heating elements in position around cylinders or the like. 30th April, 1949. (636788.)
12033. Brightside Plating Co., Ltd., and Neale, K. F.—Bags or covers for anodes used in connection with electro-plating mechanisms. 30th April, 1949. (636789.)
12113. British Thomson-Houston Co., Ltd.—Refrigerating systems. 3rd May, 1948. (636790.)
12164. Ellison, J. R.—Electric couplings. 7th June, 1949. (636795.)
12500. International Combustion, Ltd., and Davis, R. F.—Electric generating plant. 6th May, 1948. (636796).
21854. International Combustion, Ltd., and Davis, R. F.—Electric generating plants. 18th August, 1948. (Addition to 636796.) (636798.)
25632. British Thomson-Houston Co., Ltd., and Scott, W. J.—Glass-to-metal seals. 30th August, 1949. (636521.)

Claim Against S.W. Scotland Board

JUDGMENT was reserved by Lord Birnam in the Court of Session on 9th March in the action of Mr. James Paterson against the South West Scotland Electricity Board for payment of £52,408. This is claimed to be the amount of which he has been deprived by the Electricity Act, 1947.

Mr. Paterson, who is 61, stated in evidence that he was general manager of the Clyde Valley Electrical Power Co., and became managing director in October, 1943. This engagement was subject to the terms of a minute of agreement dated 15th February, 1939, and he contended that when the company was taken over as from 1st April, 1948, its whole property, rights, liabilities and obligations were also taken over. The 1939 agreement between himself and the company was effective from the vesting date as if the Board had been a party to it. He was thus, he claimed, entitled to receive from the Board the actuarial value of the salary and pension of which he had been deprived.

His annual salary, he said, was £6,000, and he also received a fee as director. If he had carried on his duties until the expiry of the agreement he would have been entitled to a pension of £3,000 per annum. In reply to Mr. R. P. Morison, K.C., his counsel, Mr. Paterson said that the minute of agreement mentioned a salary of "not less than £4,500 per annum." The £1,500 difference was a bonus which had been converted into salary. He had also been looking forward to an increase, in view of the considerable rise in revenue of the company while he was managing director. Revenue had risen from £1,507,000 in 1938 to £3,680,000 in 1947.

In reply to Mr. C. W. G. Guest, K.C., for the Board, Mr. Paterson said he was appointed chairman of the directors of Vactric, Ltd., in September, 1948, and received a salary of £1,000 per annum. Two other directorships brought him a total of £500 per annum.

After evidence by Sir Murray Stephen, director of the Clyde Valley Co. from 1929 to 1948, and Mr. Andrew R. Davidson, president of the Faculty of Actuaries in Scotland, Mr. Morison said that the only question for his Lordship at this stage was to decide the actuarial value of the salary and pension. In counsel's view, it would be quite wrong to deduct income tax or pension contributions from the salary figure in arriving at the sum claimed.

Mr. Guest submitted that, in arriving at the actuarial value, the sum to be considered was the minimum salary of £4,500 per annum, less deductions for income tax and super tax, contributions to the superannuation fund, and a further deduction for the alternative employment which Mr. Paterson had since obtained.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Australia.—BRISBANE.—3rd May. Queensland State Electricity Commission. One 750 h.p. crude oil engine and alternator. (C.R.E.(I.B.) 45212/50. Ten/1054.)*

10th May. State Electricity Commission of Queensland. Supply of two 100 kW oil engine-driven sets for Thursday Island power station. (C.R.E.(I.B.) 45817/50. Ten/1069.)*

Belfast.—31st March. Electricity Department. Fire resisting doors, phosphate dosing equipment and relay testing equipment. (See 10th March issue.)

14th April. Electricity Department. Switchgear and accessories. (See this issue.)

Greece.—ATHENS.—25th April. Ministry of Posts, Telegraphs and Telephones. Telecommunications equipment and materials. (C.R.E.(I.B.) 43996/50. Ten/1037.)*

Hastings.—29th March. Corporation. Electrical installation in Primary Schools, Parker Road. (See 10th March issue.)

Leeds.—3rd April. Transport Committee. Telephone cable and main feeder cable. (See 10th March issue.)

South Africa.—PRETORIA.—6th April. Department of Posts and Telegraphs. Paper sleeves for jointing paper-covered cables. (C.R.E.(I.B.) 45630/50. Ten/1059.)*

CAPE TOWN.—4th April. City Electricity Department. Insulated copper conductors. (C.R.E.(I.B.) 45819/50. Ten/1064.)

20th March. City Electricity Department Transformers. (C.R.E.(I.B.) 45818/50. Ten/1068.)*

Southampton.—Corporation. Street lighting relay boxes. (See 10th March issue.)

Thailand.—BANGKOK.—10th April. Department of Public and Municipal Works. Diesel-electric generating sets for power stations at Udorn Thani and Uttaradit. (C.R.E.(I.B.) 45180/50. Ten/1055.)*

Uruguay.—MONTEVIDEO.—13th April. Administration Nacional de Combustibles Alcohol y Portland. Two private branch automatic exchanges and telephones. (C.R.E. (I.B.) 46077/50. Ten/1073.)*

ORDERS PLACED

Birkenhead.—Corporation. Additional electrical installations in office accommodation at No. 3, Conway Street (£765).—Merseyside and North Wales Electricity Board.

Bournemouth.—Corporation Transport Committee. Recommended. Feeder cables for trolley-bus services, Castle Lane, including installation and jointing (£17,397).—Southsea Electricity Board. Electrical services for new Castle Lane depot (£6,470).—Aish & Co., Ltd.

Darlington.—Corporation. Installation of traffic control lights at the junction of Blackwellgate, Coniscliffe Road, Grange Road and Skinnergate (£1,215).—Siemens and General Elec. Railway Signal Co.

Gateshead.—Education Committee. Electrical installation at the Redheugh kitchen-dining room (£798).—G. F. Ellis & Co., Ltd.

South Shields.—Town Council. Electrical installations at New Downhill and Thornholme County Infants' Schools (£4,215) and wiring for broadcast reception at 10 schools (£127).—Law & Burns.

Warrington.—Corporation. Housing Committee. Electric wiring (lighting and power) at 24 maisonettes on Dallam Farm Estate (£491).—Humber Bros. (nominated as sub-contractors).

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Barnard Castle.—Houses (36, Cockfield, for R.D.C.; R. C. Williamson, Ltd., Strathmore Road, Rowlands Gill, Co. Durham.

Bath.—Rebuilding Royal Pump Room Hotel (£100,000); British Railways Hotels Executive, 222, Marylebone Road, London, N.W.1.

Birkenhead.—Technical and commercial college (£653,000); B. Robinson, borough surveyor.

Birmingham.—Extensions to factory of S. W. Woodhouse & Sons, Ltd., Cradley Heath; Robinson & Kay, architects, 94, High Street, Stourbridge.

Civic restaurant, High Street, Aston; city engineer.

Blackburn.—R.C. school, Bennington Street; Middleton & Co. (Blackpool), Ltd., Blackpool.

Blackpool.—Reconstruction of refuse disposal works (£48,600), Bispham; borough surveyor.

Bradford.—Infants' school, Eccleshill; city architect.

Bramley.—Houses (55) for Basingstoke R.D.C.; Wallis & Smith, architects, 6a, London Street, Basingstoke.

Caernarvonshire.—New police headquarters (£20,000); county architect, Caernarvon.

Cannock.—Houses (54), Bradbury Lane, Hednesford; U.D.C. surveyor.

Cardiff.—Block of offices, workshops, etc., Fitzalan Place; Institute for the Blind, Longcross Street.

* Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1 (Victoria 9040).

Chelmsford.—Works and offices, Bradford Street; Essex Chronicle, 98, High Street.

Chertsey.—Extensions to Ottershaw boarding school (£145,000); J. Harrison, county architect, County Hall, Kingston-on-Thames.

Cheshire.—Adaptation of Gawsworth New Hall as aged persons' home (£12,778); Cooper Bros., & John Clayton, Ltd., Catherine Street, Macclesfield.

Chesterton (Cambs.).—Houses (42) for R.D.C.; H. Jackson, architect, 93, Hartington Grove, Cambridge.

Cupar (Fife).—Extension scheme at County Buildings; county architect, County Buildings, Cupar.

Dartford.—Paper mill extensions (£250,000); Imperial Paper Mills, Ltd., 19, New Bridge Street, London, E.C.4.

Derby.—Radiotherapy department and wards at Royal Infirmary; Young & Hall, architects, 3, Southampton Row, W.C.1.

Dudley.—Electrical installations in 1,500 houses for T.C.; F. H. Gibbons, surveyor.

Dundee.—Nurses' training school; Johnston & Baxter, architects, Meadowside.

Durham.—Pithead baths at Bowburn Colliery for Miners' Welfare Commission; divisional architect, Queen Square, Newcastle-on-Tyne.

Houses (40), Shincliffe, for Council employees; county architect, Court Lane, Durham.

Ealing.—Slipper baths and wash-house premises, South Ealing Road; borough engineer.

Greenock.—Houses (290), Larkfield area; burgh surveyor.

Guildford.—Dwellings (46), Worplesden and West Clandon; R.D.C. surveyor, Millmead House.

Hebburn-on-Tyne.—Houses (130), Campbell Park No. 2 site, for U.D.C.; Page, Son and Hill, architects, 75, King Street, South Shields.

Hereford.—Conversion of 60 ward blocks into flats; borough surveyor, Town Hall.

Kirkby-in-Ashfield.—Houses (62), Cherry Avenue and Skegby Road, for U.D.C.; B. W. Bostock, housing architect, Public Offices, East Kirkby.

Liverpool.—Restoration of west block at Fazakerly Sanatorium for Regional Hospital Board; T. N. Mitchell, architect, 19, James Street, Liverpool.

Flats at Edge Lane for T.C.; F. C. Bloomfield & Co., Ltd., 71, Almonds Green.

Factory, Henry Street; Levy Bros. & Knowles, Ltd., Edmund Street.

London.—SOHO.—We regret that in our issue of 3rd March (p. 418) the contractors for an office block in Soho Square were given as Bernard Sunley & Co., Ltd. The work is actually in the hands of Bernard Sunley & Sons, Ltd., 34, St. James's Street, London, S.W.1.

BATTERSEA.—School for L.C.C.; Sir John Burnet, Tait & Partners, architects, 10, Bedford Square, W.C.1.

HACKNEY.—Block of flats, Prout Road; Frederick Gibberd, architect, 35, Gordon Square, W.C.1.

ROTHERHITHE.—Three-storey dairy, 281/283, Southwark Park Road; Arthur H. Russell, 9, Duke Street Hill, S.E.1.

Merthyr Tydfil.—Infants' school (£55,000); borough engineer.

Midhurst.—Houses (40), West Lavington, for R.D.C.; T. Greenfield, architect, Newstead, Midhurst.

Mold.—Houses (20), Clay Lane, for U.D.C.; R. Lloyd Roberts, architect, Dyffyr Chambers.

Neath.—Dwellings (192), Cimla area; borough surveyor.

Newcastle-on-Tyne.—Milk processing factory for the Newcastle & District Dairymen's Association, in Benton Park Road; Shield Bros., Ltd., Back Park Terrace, Swalwell, near Gateshead-on-Tyne.

Newcastle (Staffs).—Extensions, Liverpool Road, for Joseph Jones; Hollins Jones & Oldacre, architects, Lloyds Bank Chambers.

Orpington.—Rebuilding ward blocks at Orpington Hospital; South-east Metropolitan Regional Hospital Board, 11a, Portland Place, W.1.

Ramsey (Isle of Man).—Nurses' Home for Cronk Raugh Sanatorium; A. Sturrock, architect, Murray House, Douglas.

Ruislip (Northwood).—Houses (88), Pine Gardens, Eastcote; U.D.C. surveyor, Council Offices, Northwood.

Sheffield.—Research laboratories; United Steel Companies, Ltd., 17, Westbourne Road.

Spalding (Lincs).—Houses for R.D.C.; G. Calverley & Sons (Contractors), Ltd., Leicester (26 houses), Drury & Co., Ltd., Wigston, Leicester (34 houses).

Staveley.—Houses (32), Inkersall Green, for U.D.C.; H. Cott, surveyor, Council Offices, Lowgates, Staveley, Chesterfield.

Sudbury.—Infants' school, for West Suffolk C.C.; county architect, 13, Westgate Street, Bury St. Edmunds.

Surrey.—Houses (40), Burpham; county architect, County Hall, Kingston-on-Thames.

Tipton.—Primary school, Ocker Hill; A. C. H. Stillman, county architect, Earl Street, Stafford.

Truro.—Extensions to Royal Cornwall Infirmary (£100,000); South West Regional Hospital Board, 2, Elton Road, Bristol.

Wallasey.—Reinstatement of civic hall; Wm. Moss & Sons, Ltd., Liverpool.

Wallsend.—Houses (50) for T.C.; J. Armstrong, builder, West Farm estate.

Cyprus Power Project

THE Colonial Office announced on Monday that the tender of Sir Lindsay Parkinson & Co., Ltd., London, in association with the Titan Construction & Engineering Co., of Nicosia, Cyprus, amounting to £182,962, has been accepted by the Cyprus Government for the civil engineering and building work connected with the construction of a new power station at Dekhelia. The work covered by the tender is expected to be completed by November, 1951, and will be the first part of a project to supply electric power to almost the whole of the island.